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MODEL**

January 1990

**DURABAT
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AIRPLANE

THE WORLD'S PREMIER R/C MODELING MAGAZINE

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PILOT
PROJECTS**



**HELI EVENT:
SCHLUTER CUP**



MODEL AIRPLANE NEWS



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Editorial

by RICH URAVITCH



JUST ABOUT WHEN you're reading this, Christmas will be fast approaching. I know that you've sent your Christmas lists to Santa, or his locally designated representative, and you've included all the new things (or replacement parts) that you discovered you needed throughout the year. It's been a really terrific year, but like so many other things, it must come to an end.

We've taken the time to evaluate what we think you'd like to see in *Model Airplane News* this next year. Some changes are coming, and we're sure most of you will be pleased. It will be just as we said when we added the helicopter section: It isn't at the expense of anything else in the magazine; only an addition to acknowledge and support a segment of our sport whose time has come. We'll freshen the visual part of *MAN* up a little. The material will remain essentially the same; it will just be presented a little differently to make it a bit easier to read. We think you'll like it.

We're also introducing a monthly presentation of *your* photographs of *your* models, starting with this issue. We're calling it "Pilot Projects," and, like our "Reader Reports," its purpose is to showcase your newest (or favorite) project, and to give you a chance to tell us something about it. (Look for details elsewhere in this issue.)

Those of you who favor Rossi engines for your performance machinery will be pleased to know that a dedicated organization, Rossi USA, has been established in New York. Not too long ago, I attended an open house at its brand-new facility, and I spoke to Mr. Ugo Rossi through his charming interpreter Danila Gallina. I was advised that the problems of parts availability and product support have been overcome, and things will continue to improve in 1990. This is good news, especially for you ducted-fan enthusiasts. I was treated to a tour of the facility by Cindy and John Tribiano, the principals of the new organization, and I was impressed by the variety of stock in the warehouse. Spare parts are on hand for the current engine lines, and John confirmed that the pipeline for the earlier series of engines should be filled shortly. If you need parts, contact them directly.

As I've said; 'tis the season, so on behalf of the entire Air Age team, have a very merry Christmas and a safe, prosperous, New Year. ■

MODEL AIRPLANE NEWS

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duke's mixture



If you have ever wondered how to approximate the best propeller for your airplane and motor, here is a quick way that I have used for years. First, estimate the miles per hour that you expect your airplane to fly, then divide that by how many thousand RPM you expect the motor to run. The answer would be the pitch in inches. Here are a couple of examples: Assume your airplane would fly 60 miles per hour, and the motor wants to turn 12,000 RPM. $60 \text{ over } 12 = 5$, which would be the pitch of your propeller in inches. Another example: Assume you had a nice clean sport model that you expect to fly about 90 miles per hour. The recommended RPM on your motor is 12,000 RPM. $90 \text{ divided by } 12 = 7\frac{1}{2}$ inches pitch. The diameter of the propeller should be as required to get the motor to run slightly below the manufacturer's recommendation.

Now, about noise, a rounded blade tip usually runs somewhat quieter than a square blade tip. A wide blade propeller also runs quieter than a narrow blade propeller. A three blade propeller runs quieter than a two blade. Two two blade props stacked at 90° runs quieter than a three blade.

Would you like a nice flight jacket with the Fox logo on the back? I am happy to report that we now can supply you a real nice jacket for \$25.00. These are made by one of our local flyers, who is in the jacket manufacturing business. Available sizes are medium, large, extra large, and XX large. I am 6' tall, and weigh 240 pounds, and wear an XX large. If you would like one of these jackets, just send us your \$25.00, the size you want, and name and address, and we will send it to you on U.P.S. These normally would sell from \$30.00 to \$40.00 without the logo in most clothing stores.

Fox 40 flyers will be happy to know that we have altered our tooling and strengthened the flange on our mufflers and the exhaust stack, which hopefully will eliminate what has been a weak spot on these motors.

I am happy to report that we are now finally producing Eagle 4's in both 60 and 74 displacements. Why we are a year behind schedule is a long story, but briefly, we lost two valuable production men, one to an old war wound that flared up and forced his retirement, and the other to a larger company. Furthermore, our production has been further hurt by the recent scarcity of ball bearings. I think we should be okay for 1990 however, as the bearings we ordered last spring are now beginning to come in.

Now, a word about the flexible mounting system now being promoted. While it is true that this may reduce vibration noise somewhat, the violent shaking of the motor is very hard on the glow plugs, and the muffler mounts. From our point of view, we feel that the more rigid you can mount your motor, the better off you are.

Enjoy your modeling.

Duke Fox



Manufacturing Company
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Fort Smith, AR 72901
Phone (501) 646-1656

Airwaves

WHERE TO WRITE TO US

If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Airwaves" Model Airplane News, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to Connecticut, and this leads to long delays.

Solid Training Plan

Thanks for letting us reprint Joe Wagner's March '89 article on noise. Several of our club members really appreciated it.

Our club has two flying sites: One is in the midtown area of Hampton, VA, and the other is in the country. We're really strict with our noise and safety regulations—98dB (max.) at 3 meters. We end the year with almost 200 members, so we must have discipline, and our field marshalls do a good job. Flight instructors and manuals are used for new members who know how to fly R/C. Instructors sign off the students in the manual as progress is made. The meeting following a solo flight is special because students are presented with certificates that recognize them as new pilots. Our different colored badges designate their capabilities.

I'm now building a 43-inch-span, electric-powered P-51. I bought a House of Balsa kit designed by you, Rich but I've made the model significantly lighter by using a built-up stick fuselage covered with $\frac{1}{16}$ -inch contest-grade sheet balsa. I hope to come in with a structural weight of 12-14 ounces.

I'm using a Futaba Attack with speed control and battery eliminator circuit (BEC) that weighs about 5 ounces. Since my propulsion-system weight is 21 ounces, all-up weight is targeted at 40-42 ounces. I'll take some photos on the first flight!

I sure appreciated November's Electric issue. Scale models are my favorite, and this P-51 is my first electric. (I built my first model in 1927!)

ROBERT W. RAINEY
Newport News, VA

Bob, sounds to me like your club has hit upon a plan where becoming an R/C flier is a clearly defined progression. One of

the biggest problems is designating instructors and getting them together on a regular basis with their students. I think your methods might make an interesting article that could be used as a guide for other clubs to use. How about it?

I'm glad you liked our Electric issue, and we're looking forward to photos of your modified H.O.B. P-51. **RAU**

Invaders from the Bronx?

I'm looking for R/C model plans for the A-26 Invader with .25 or .35 twin engines. Any suggestions?

JOSEPH G. MANGINELLI
2425 Arthur Ave.
Bronx, NY 10458-6001

Joe, nothing comes immediately to mind. The closest I can come is a B-25 Mitchell that was presented in MAN a few years back. Any readers out there able to help?

RAU

P.S. from "Sparky" DeBolt

In my "Electric Prop Design" article in the November '89 issue, I made the following statement: "Prop manufacturers just haven't recognized the special requirements of E.P. Props."

In that article, I wrote about how to adapt commercial wooden propellers that are normally used for engine power to E.P. needs by using a folder hub that would bring the engine-style props closer to optimum for E.P. It's a fact that no wooden-prop manufacturers (in the USA, at least) list types and sizes that can be optimized for E.P. They also haven't responded to offers of help in this regard.

In no way did this article address (nor was it intended to) the numerous specialized E.P. props that are available from a variety of sources. It wasn't meant to be a comparison, even if what we've done could be shown to be superior. The bottom line is that there's a desperate need for optimum E.P. props that are as reasonably priced as the engine types.

HAL DE BOLT
Sun City Center, FL

(Continued on page 10)

More Fun. Less Funds!



ESCAPE

SPECIFICATIONS:

Wing Span 62½ inches
Wing Area 770 square inches
Engine Size 10 cc
90 or 120 four stroke

Designed for AMA for the FAI Turn-around pattern. Foam wing and stab with 3-32 Balsa sheet covering. Tricycle or conventional gear, fixed or retracts. Rear or side exhaust, fiber glass canopy. Very positive and maneuverable.



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Engine Size .50-.60 (Glow)
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Airwaves

We've Got the Game, Who's Got the Rules?

I've been reading a lot about R/C planes in different magazines, including yours. I'm not sure about R/C flying regulations in the U.S. Can I fly R/C anywhere? Also, can you tell me what the word "combo" means?

PURSER PABS PANES

Miami, FL

Hold on, Mr. Panes! Before you turn on any switches and risk some expensive equipment, let me try to help. All R/C modeling activities in the U.S. are governed by regulations established by the Academy of Model Aeronautics (A.M.A.), and it works in conjunction with federal agencies when required. Radio operation is regulated by the F.C.C. (Federal Communications Commission), while airspace is controlled by the F.A.A. (Federal Aviation Administration). So, I'd advise against flying "anywhere you want."

To obtain a copy of the current rules and regulations, contact the A.M.A. (1810 Samuel Morse Dr., Reston, VA 22090), and then check with a local hobby shop to determine where the R/C clubs in your area fly. Connect with one of them and ask for help. Soon you'll be soaring with eagles, legally!

"Combo" is an American-generated word that's a contracted form of "combination."

RAU

Cranky Carbs

It would really help if you would do an article on how to adjust R/C engines (2-stroke) to obtain the most power and make them idle correctly. I don't know what the little setscrews do, but when I start playing with them, things usually get worse. Also, what do the various fuels do, and how do they affect engine performance?

DAVID SIMS

Brundidge, AL

Dave, your question frequently comes up, and it's an excellent one. Unfortunately, the answer would take up more space than this column allows. We're preparing an

article on this subject, so I hope that you can wait. In the meantime, check the engine manufacturer's instructions; if you follow them exactly, they should supply the answers.

RAU

Flying Electric Fan?

A few months ago, I wrote to you about an idea that I was working on to improve the efficiency of the ducted fan. I also wrote to Byron, Bob Violett and Jet Hangar Hobbies and, as yet, I haven't received a reply. I'd appreciate your input on the use of electrics in ducted-fan applications, or on where to obtain this particular info. I enjoy your magazine very much—keep up the good work.

PAUL MORTIMER

Citrus Heights, CA

Paul, ducted-fan electrics have been flown successfully in various countries around the world, but, for the most part, they've been non-scale airplanes. Try contacting Bob Boucher of Astro Flight (1331 Beach Avenue, Marina Del Rey, CA 90292, 213-821-0291) for his views on fan flight. He and I are working on a similar project, which we hope to present (if successful) in a future issue. He's certainly got the hardware!

RAU

Thanks for the Memories

During the winter of 1947, I built a Swoose. It took a long time to carve and chop the fuselage from a solid block of wood. The model, powered by an Arden with ignition and an Austin timer, didn't leave the water's surface the first few times that I tried to fly it. Then, with a light breeze rippling the water, the Swoose lifted off. It went up in a shallow climb directly into the breeze and out toward the middle of the lake. My flying buddy and I were in a rowboat, and we tried to keep up with it. The timer malfunctioned (at least, that's what we thought), because the model continued toward the opposite shore, which was 13 miles away. It was OOS (out of sight), but we could still hear the engine running. Our journey back to shore was quiet and not

(Continued on page 12)

DU~BRO TRU~SPIN KEEPS YOU IN BALANCE!

BALANCES:

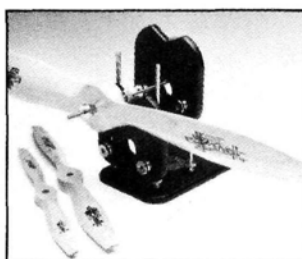
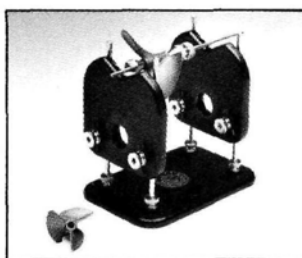
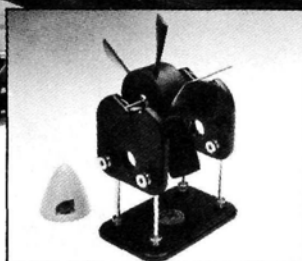
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Airwaves

(Continued from page 10)

very cheerful.

When I saw the picture of the Swoose on the cover of the October MAN, the memories of all those wood chips and that single flight were vividly brought back—even after 42 years! Thanks again for the copy of the original article and for the plan.

KEN SIMPSON
Cedarburg, WI

Ken, glad we could help. A lot of our readers weren't around when the original Swoose appeared, but interest in Zirol's R/C version sure supports what we said in the article: "Good, basic designs are timeless." Sorry you lost your Swoose; how about sending some photos of the new one?

RAU

B-17 Bound?

I was looking for a kit with four engines, especially the B17, and was happy when I read about such a kit in MAN's March '89 "Airwaves." Mr. Richard Kaff of Westcraft, CA, gave an address for Westcraft. Well, I have written to them, but haven't received an answer. Is it the right address? Maybe Mr. Kaff can help.

My regards to all American model builders. If anyone is interested in corresponding and eventually exchanging American and European kits, I'd be interested.

KELD BAEK
Overbyes Alle 27
2500 Valby
Copenhagen, Denmark

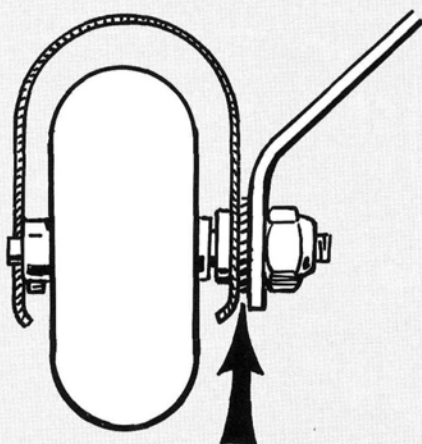
Keld, thanks for writing. To the best of our knowledge, Westcraft is still producing the B-17 kit. In fact, at least 10 of them were scheduled to appear at a Bomber Field Fly-In in Monaville, TX, on October 28 and 29. This event was hosted by B.B. Weber, and we hope to bring you coverage in a future issue. We'll print your entire address—maybe other readers can help.

RAU

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," Model Airplane News, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and length.

Hints & Kinks

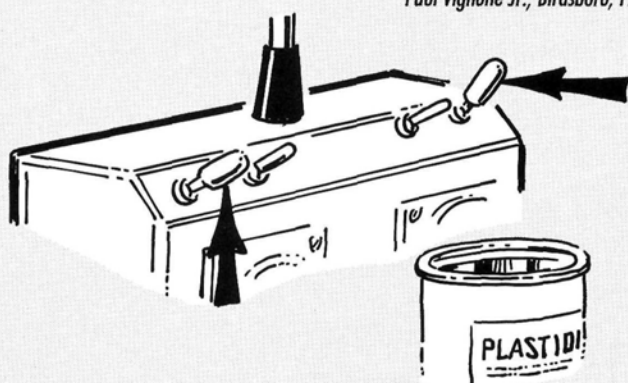
by JIM NEWMAN



WHEEL-PANT FIXING

Wheel pants have a tendency to rotate around the axle. The simple addition of a toothed lock-washer (arrowed) will keep the pant nicely aligned and parallel to the ground. Of course, this will only work on aluminum landing-gear legs.

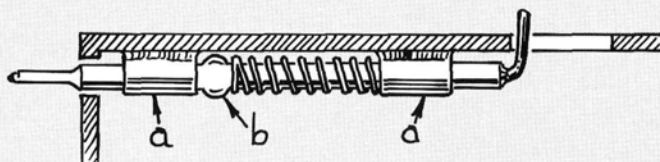
Paul Vignone Jr., Birdsboro, PA



TRANSMITTER-SWITCH I.D.

Some transmitters have an abundance of switches for auxiliary functions, and there are times when it's hazardous to take your eyes off your airplane to identify a switch. The more critical switches can be dipped in Plasticote, which is a rubbery coating generally used on tool handles. This way, you'll be able to identify critical switches by feel.

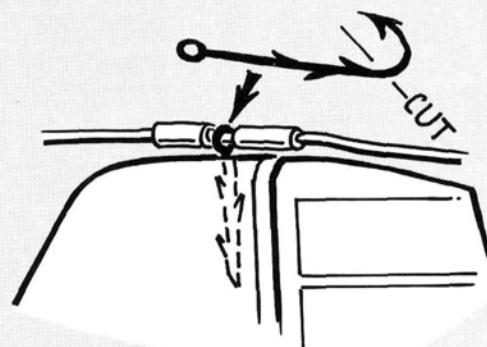
Lee Goldstein, Van Nuys, CA



HATCH LATCH

Here's an almost ready-made, spring-loaded, hatch latch—an empty ball-point pen cartridge. Two pieces of brass tube (a) are the bushings, and these are glued below the hatch structure. Note that the spring has been located *behind* the two ears (b) on the cartridge.

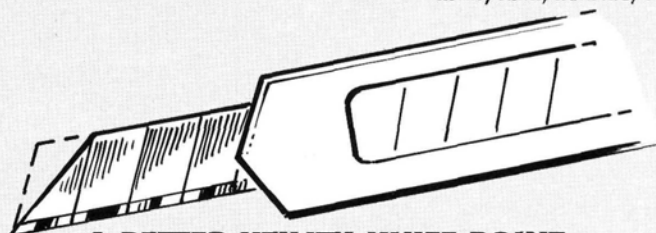
Jim Simpson, Sanger, TX



ANTENNA ATTACHMENT

Yet another ingenious fin-top fitting for that antenna wire. Cut a barbed fish hook as shown, then embed the barbed shaft into the tip of the fin. It's important that you select a hook with an eye that will accommodate the antenna wire, which is retained by pieces of plastic tube firmly fitted over it, fore and aft of the eye.

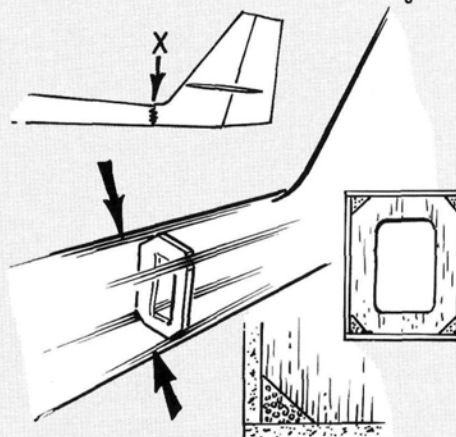
Rodney Fisher, Travis AFB, CA



A BETTER UTILITY-KNIFE POINT

Those knives with the snap-off blades aren't pointed enough for successful rib-slotting. Carefully grind off the end of the knife to make a more acute angle, but be extremely careful *not* to burn the tip and destroy the temper of the metal.

Luigi Micheli, Viareggio, Italy



FUSELAGE STRENGTHENING

Those slender fuselages are very vulnerable, especially just in front of the stabilizer. Pull some long threads from a piece of glass tape, combine them into one cord, then use CA to glue them into the corners of the structure, cutting away the corners of the formers to make space for them. Our German friend says this creates tremendous stiffness at little cost.

Holger Morgenstern, Dresden, W. Germany

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

PILOT PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOT\$!

MAN is your magazine and, as always, we encourage reader participation. In this new section, "Pilot Projects," we'll feature pictures from you—our readers. Both color slides or color prints are acceptable.

All the photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of 1990. The winner will be chosen from all entries published, so get a photo or two together plus a brief description and send it in!

Send those pictures to:
Pilot Projects, Model Airplane News,
251 Danbury Rd., Wilton, CT 06897.



Tiny T-Bolt II Twin

From Cheltenham, England, comes small-fan aficionado Alec Cornish-Trestrail, proudly displaying his ducted-fan A-10A, which is shown here in 23rd TFW markings. Alec recently visited the colonies and checked out fan flying in Florida.



New-Generation Tri-Motor

"It really flies!" That's what Bill Hempel of Tucson, AZ, wrote when he sent us this photo. You're looking at a tri-engine original, and Bill claims it's unique! Think it's just a twin? Engines look too small? There's a Dynamax ducted-fan unit lurking between the two fuselages!



The Rhine Whine is from a Ducted Fan

Kazlo Eisele of West Germany sent us some interesting snapshots of his twin, 60-powered, Beech Starship and his F-90 European fighter, which has now been reconfigured with a ducted fan. A resident of the Rhine Valley region, Kazlo took flying lessons at a model flying school in Australia. Nice work, Kazlo.



Flying Balsa Factory

Another "hello" from overseas—way overseas! D.H. Townshend of Singapore sent us this snapshot of his Valkyrie being held by the friend who helped him build it. The plane was constructed using blow-ups of Carl Goldberg's plans and, as you can see, the result is outstanding.

PILOT PROJECTS



Monocoupe Mavin

Here's Donald Williams of Cedar Rapids, IA, with a Monocoupe that was built using MAN's plan no. 2811. He has built six of these beauties and is currently working on number seven; in fact, he's closing in on the full-size Monocoupe's production level! Donald uses a .91 2-stroke for power and sure seems to have the art of covering down pat!

Attractive Autogyro

Nicholas J. Agneta, an illustrated design associate from North Bellmore, NY, sent us this great photo of his KT-1 autogyro. Nick says, "What started out as a nice project turned out to be a time-consuming R&D project." We say the result speaks for itself, and we're eagerly awaiting first-flight reports.



It's the Beaver, Wally!

Here's a contribution from Roy Day of Rockville, MD. It's a Unionville Models deHavilland Beaver powered by an O.S. 48 Surpass FS using an 11x7 prop. He says, "It's a superb flier; it's great fun to land and take off using the flaps."

No-Tail Flies?

Here's the Shooter—one of the Twenty First Century Simitar Series. Sent to us by Bill Evans of Bishop, CA, this .40-powered beauty has a 50-inch wingspan. Bill is an expert who has practically written the book on tail-less designs; we're expecting one from him soon.



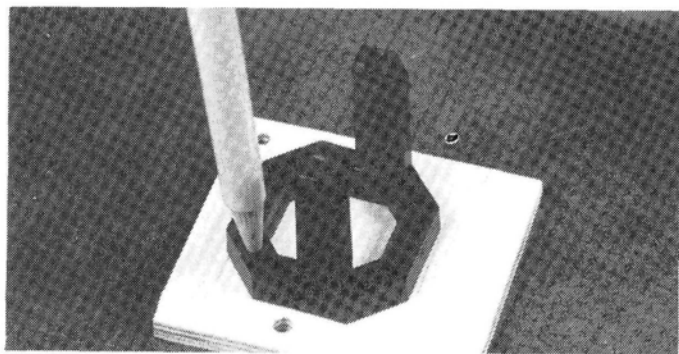
Reduce the hardware bill; perfect for small-displacement engines.

How To:

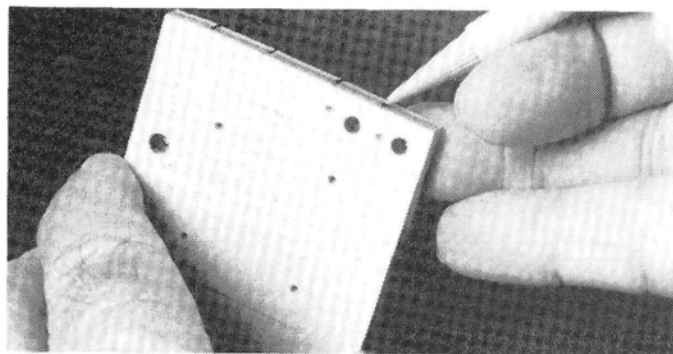
by RANDY RANDOLPH

TRY WOOD SCREWS IN PLACE OF T-NUTS

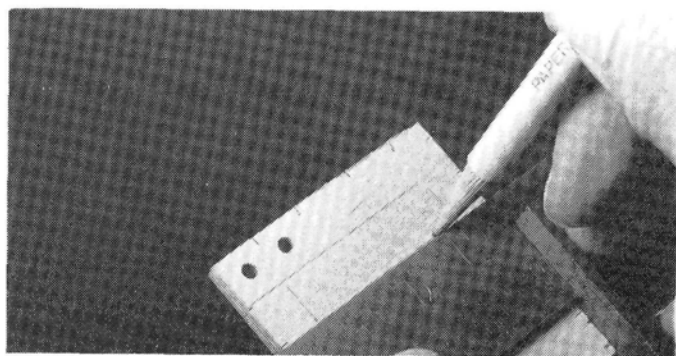
Using machine screws and T-nuts has been the most common method of attaching engine mounts to fire walls for some time, but it isn't the only way. When used properly, wood screws will replace these devices in a most satisfactory manner! The photos show the way.



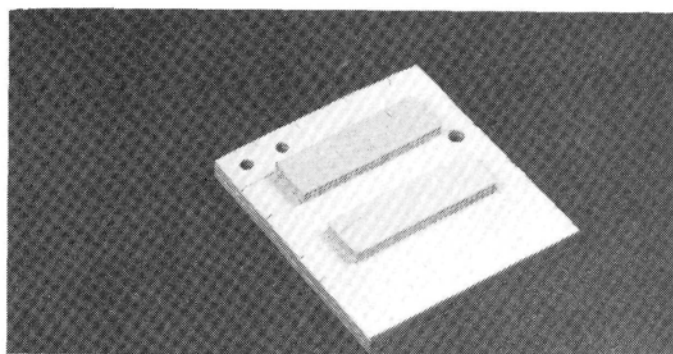
1. Position the engine mount on the fire wall. Using a fine-point pencil or pen, mark the location of the mounting holes on the fire wall. The plywood for the fire wall should be at least $\frac{3}{16}$ -inch thick for the smallest engines and $\frac{1}{4}$ -inch thick for the .20 to .60 sizes.



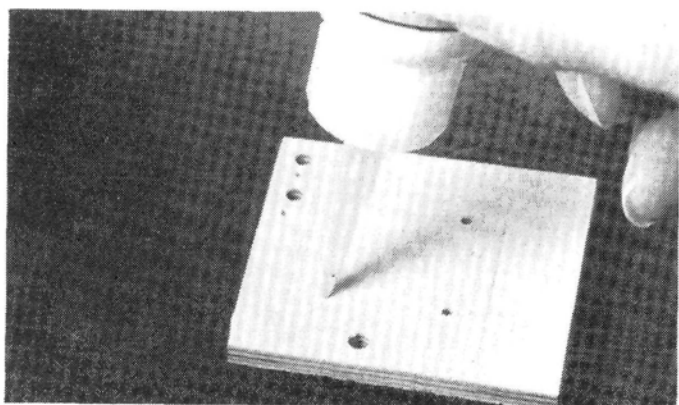
2. Mark the top and side edges of the fire wall $\frac{3}{16}$ inch above and below the mount-hole locations. Be sure these marks are visible on the rear of the fire wall.



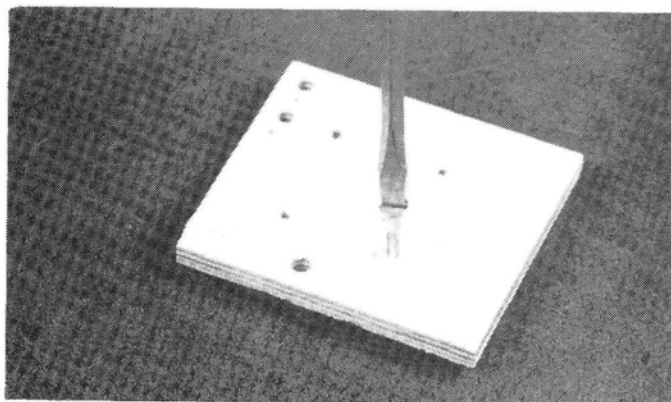
3. Using a square, outline the location of the back-up pieces on the back of the fire wall. They'll be $\frac{3}{8}$ inch wide and extend $\frac{3}{16}$ inch beyond the mounting holes.



4. Cut two pieces of plywood the same thickness as the fire wall, and epoxy them in the locations marked on the back of the fire wall. The other holes in this fire wall are for fuel and throttle lines.



5. Using a drill bit one size smaller than the screws, drill through the hole locations that are marked on the front of the fire wall. Harden the edges of the holes with an application of thin CA.



6. Thread the holes by running screws through the fire wall and back-up plates. The screw size is determined by the size of the hole in the engine mount. The screw should be the same diameter as the hole and extend at least $\frac{1}{8}$ inch beyond the back-up plate when the mount is installed.



Quiet Flight

by JOHN LUPPERGER

Noisy sailplanes? Rotating wings for roll control.



Daryl Perkins' Falcon 880 soars gracefully out over Hughes Hill in Los Angeles, CA. Daryl beat many slope-racer designs in an F3F competition with the Falcon, which was designed as a thermal soarer.

THE FUTURE! WHAT does it hold for R/C? It seems that hardly a month goes by during which we don't hear of a club losing its flying field, but most of these unfortunate clubs are for *powered* planes. The main objection voiced by clubs' neighbors concerns the level of noise produced by the planes.

I recently went to Mile Square Park, Fountain Valley, CA, to watch some powered sport flying. This public flying field has endless (so it seems) blacktop runways, a large paved pit area and convenient parking—a power flier's paradise. The field also has a golf course at each end (about 1/4 mile in each direction from the center of the pits), and the golfers don't like the loud model aircraft.

There are rules governing the level of noise that's supposed to be acceptable, and all models must be properly muffled. On this Sunday, however, I was surprised by the apparent lack of concern for the noise levels of most of the models flying. On

any given Sunday, a couple of hundred models take to the air during the day. It's distressing that up to half of these generated noise levels well above those we've come to regard as acceptable. They were, in fact, so noisy that engines equipped

with stock mufflers couldn't even be heard!

Since this is a column about gliders and electrics, you might be asking yourself, "What's the point of this? Our models don't make any noise!" That's precisely my point! How can we educate power modelers about quiet alternatives? I don't want to make them give up the style of flying they enjoy, but I'd like them to see that electrics have become a viable alternative. In the Sportsman Sport Scale Class at the Nats this year, second place was won by an *electric* model.

When flying fields are lost as a result of their neighbors' complaints, we all lose. Those who aren't involved in R/C tend to "lump" us all together; all model airplanes are the same to them. They remember that a previous R/C model bothered them, and they don't want to see any type of flying taking place within earshot of *their* homes. It's sometimes impossible to convince them that your model won't offend them with its noise. So, next time you get a chance, try to turn a power pilot on to the joys of silent flight; our future might depend on it!

F3B Finals

I don't usually write much about FAI events, as most of the letters I receive show little interest in these areas. News is



The Roto 1 uses elevon mixing to control the wings for roll and pitch. The full-span flaps are controlled by a single servo in the fuselage. Harley would like to make contact with some experienced scratch-builders to work on further development of Roto Flap concept (see text for more details).



Harley Michaelis with his Roto 1 sailplane, which features wing-pitch and roll control. T-tail has an unusual gull planform that gives the model a very distinctive look.

news, however, and I think even the sport fliers out there would like to know how our team did in France.

First, I congratulate England's Nic Wright on his victory this year. My English friends tell me that Nic is a super guy and that he has been trying hard for several years to win the World Championships. I've included a three-view of Nic's model, the Electra El. Everyone always says that a winning F3B model must be state-of-art and use up-to-the-minute technology and aerodynamics. Nic's model, however, was designed and first flown in June 1980! So much for *that* "state-of-the-art" theory!

Well, just how well did our team do? Not as well as they would have liked, but

two of our competitors placed in the top 10. Seth Dawson placed 7th; Larry Jolly, 10th; and Richard Spicer, 31st.

These standings earned the U.S. team 5th place out of a total of 19 teams. We may not have *won*, but we showed the rest of the world that we *are* competitive. Congratulations to our team for its efforts in representing the United States!

Roto 1 Sailplane

While at the Nats, I met Harley Michaelis, who has developed an unusual new sailplane design, which is really dif-

ferent and a little difficult to describe, so I'll let Harley take over:

"The Roto 1 introduces 'Roto-Flap'—an experimental, new control system for the competition thermal sailplane. On two servos, the wing panels rotate for turn and pitch using a transmitter with 'elevon' mixing capability. There are no ailerons, and the stab doesn't move.

"Since ailerons aren't used, long flaps on a single servo can be dedicated to camber change and drag-inducing functions. For low-speed, precision landings, long flaps dropped 90 degrees are more effective than 'crow.' The complexity of coordinating three or four servos for crow is eliminated.

"The optional rudder may be cable-operated by a small servo to minimize weight and bulk going in the tail end.

"The ship is flown using the most common, most conveniently placed controls. Turn and pitch are on the usual sticks. Flaps are on the throttle channel. For penetration, some stick movement, or the trim tab, can be reserved for reflex. Only a 4-channel receiver is needed.

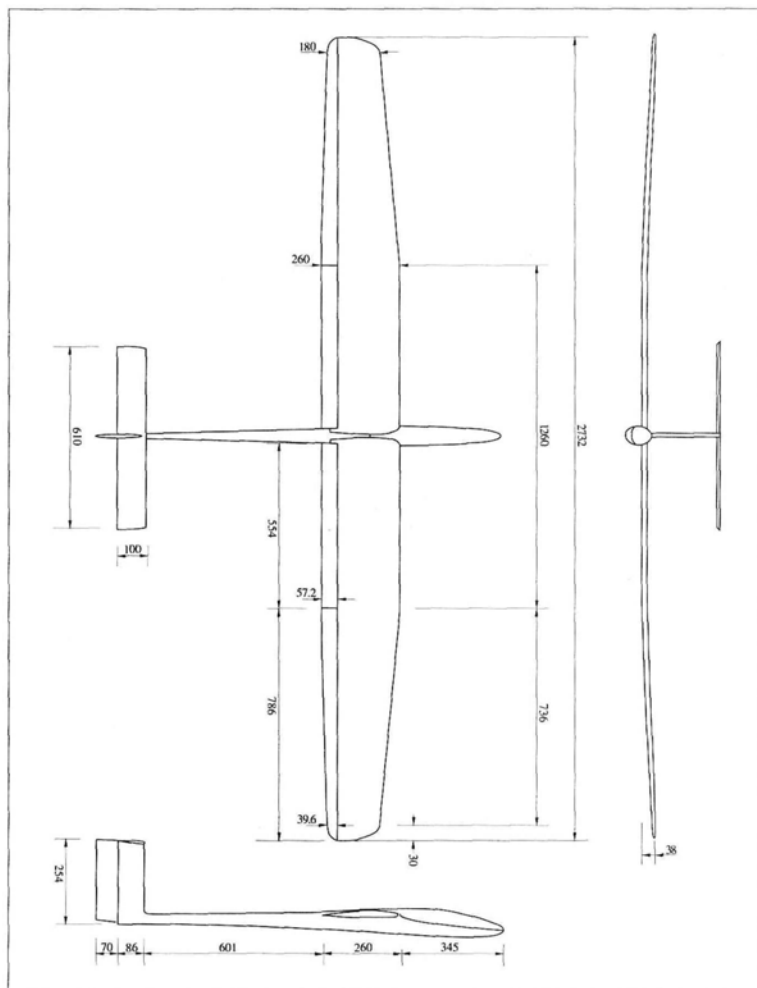
"With minimum hardware in and to the tail, the fuselage rear and tail feathers can be lighter, slimmer and more aesthetically pleasing. The reduction in servo count, hardware, bulk and amount of nose lead usually needed, means a significant overall weight reduction without compromising basic structural integrity.

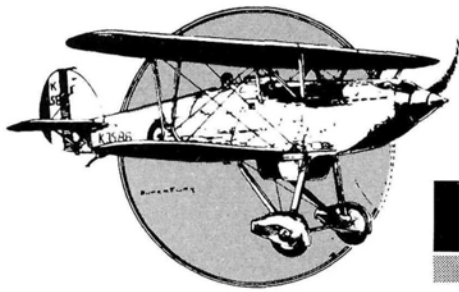
"Details: Airfoil: SD7032—deemed 'the best of the lot' by Mike Selig after the low-Reynolds-numbers wind-tunnel tests at Princeton.

"Heavy-duty, ball-bearing servos, special bellcranks and drive pins rotate the panels on a 1-ounce, 5/16-inch carbon-fiber rod, and declining wing tubes provide dihedral.

(Continued on page 62)

Three-view of Nic Wright's Electra El World-Championship-winning aircraft. Span: 2732 mm; area: 63.8 square decimeters; airfoil section: RG 14A 1.4/7; weight: 2494 grams.





Fifty Years Ago

Planes for war dominated the first MAN of the '40s

by KEN RUDDOCK

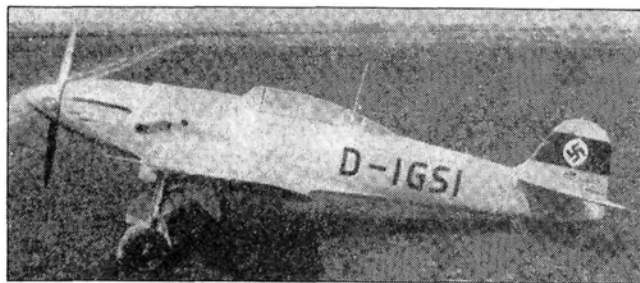


THE STORM CLOUDS of war were spreading throughout Europe and Asia as Americans—still at peace—ushered in a new year and a new decade. The deep Depression that had gripped the nation throughout the '30s was over by January 1940, as most Americans were back at work—many working in plants building the tools of war for our allies in Europe. Signs of the growing worldwide conflict could be seen everywhere. Soon, Americans would have to reduce their dependence on the use of gasoline, rubber and other precious commodities while steel production for automobiles and private aircraft was cut back. Rationing would become a way of life, while sauerkraut was whimsically called “liberty lettuce” by patriotic Americans.

Even the cover of the latest *MAN* issue reflected the times. A Douglas Attack Bomber DB-7-B3 (precursor to the A-20 Havoc) was pictured zeroing in on its

target. Inside, the latest installment of “War Wings Over Europe” showed “an intimate glimpse and a comparison of the fighting power of the aerial steeds in which Europe’s warriors are battling for supremacy.” The article, penned by Robert McLarren, predicted it would be a “war in the air” and the author painted a scene for his young readers who may have joined their colleagues in Europe several years later. “A canvas splashed with the crimson of flaming ships,” McLarren wrote. “The blackness of smoking ruins, the livid whiteness of fear-strained faces and the yellow-and-green flecked streams of machine-gun fire.” How true his colorful description would seem on December 7, 1941, and on the many days that followed for almost another five years.

The article profiled the latest aircraft for war complemented by many black-and-white photographs. Pictures showed the famous Heinkel He. 112, a Supermarine “Walrus” seaplane being launched from a British cruiser, a German Dornier



The German-built Heinkel He. 112 was one of many full-scale aircraft featured in “War Wings Over Europe.” The war effort was getting everyone’s attention.

“flying pencil” and a Vickers Wellington bomber. The spread gave modelers an excellent picture of the “real thing.”

Under the title, “Planes Without Countries,” the author talked about such American planes as the Martin 166 bomber, the Lock-

heed Hudson medium bomber and the Douglas DB-7 fighter-bomber. They weren’t yet being used, and the author asked, “What’s to become of them, those hundreds of slashing, wicked fighting craft which are without superior the world over?” Within a year, he’d have his answer as America became more involved in the raging war, finally entering the conflict at the end of ’41.

Planes for War and Peacetime

The January 1940 *MAN* included the plans for the Douglas Attack Bomber pictured on its cover, while an article, complete with detailed construction plans, featured the more docile Rearwin Speedster by Earl Stahl. It was called “the perfect flying scale model—realistic in appearance, a fine flier and easy to build.” The article contained a number of photographs as well as a full description. The full-scale Speedster, which lived up to its name, was powered by a 125hp Menasco engine, and it could do 150mph. The nonstop range, at 130mph cruising speed, was 550 miles. The machine was relatively economical, averaging 17 miles per gallon—certainly not even subject to today’s “gas guzzler” automotive surtax.

Columnist James Custin tried to explain the long-unanswered question, “What is this Reynolds Number?” “Most model builders,” he explained, “know that the general formula for the lift developed by a wing is: $L = A \times V^2 \times C \times D$, where L



Sidney Struhl’s Chickadee was well proportioned and had its landing gear positioned well forward for improved ground handling.

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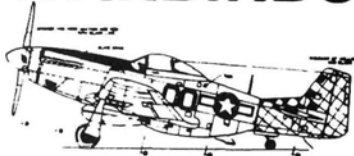
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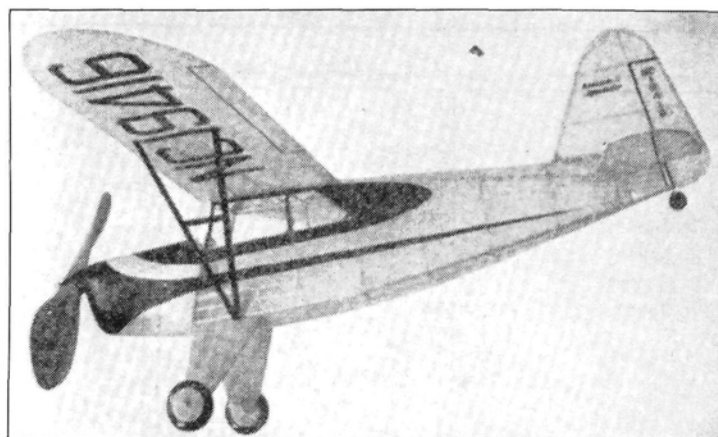


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FIFTY YEARS AGO



Earl Stahl's realistic rubber-powered Rearwin Speedster was very graceful with its streamlined fuselage.

is the lift, A is the area of the wing, C is the coefficient of the lift of the particular airfoil used, and D represents the density of the air." Even after 50 years, however, many modelers talk about Reynolds Numbers, but only a small number understand their impact on our sport. Perhaps it would be worthwhile to explain them once again. Maybe you readers have some ideas?

In "Gas Lines," a MAN regular feature in the '40s, the winner of the IGMMA (International Gas Model Airplane Association) trophy was announced. Dan Veronica of Buffalo, NY, won the trophy by making a flight of 45 minutes, 35 seconds, at a contest sponsored by the Syracuse Model Airplane Club. Other model



John Clemens with his winning Hell's Fire in 1940. Johnny is still a very active modeler.

airplane pioneers, including John Clemens, Henry Struck, Roger Barton and Louis Garami (who were pictured with their winning aircraft) were featured in "Gas Lines." Don Miller of Minnesota was included in the column with his sea-plane model. "Flying a model from the water is the cream of our hobby," he told MAN. "It combines the fun of being on the water with flying, and there is no danger of a model draping itself around a post or tree." Some 50 years later, the hydro models are still popular for the same reasons, as shown by the popularity

of our annual "Floatplane" specials.

Other articles in that first issue of the new year highlighted a timer mechanism for small gas models, the Douglas DB-7 (which was being used in France), and the Chickadee—"a simple, sturdy, gas model of streamlined design that flies with great precision." Sidney Struhl's article on the Chickadee was complete with assembly

drawings and photographs, and it offered readers complete instructions on how to build this rugged-looking plane. Modelers were told, "the ship must be super-stable to take care of a variation of powers and speeds," and

"must have strong construction features to take consistency of flight and manhandling." The Chickadee had an amazing short takeoff run and was able to climb vertically in a fast and tight spiral. It featured a Grant X-8 airfoil in the wing and a slightly modified M-6 airfoil on the lifting stabilizer. Other nice features the author spoke of were the wheels, which were placed well forward to prevent broken props and nose-overs in landings. Even back then they had their share of unwanted ground-based mishaps!

(Continued on page 70)



**This pocket-size, scale,
ducted-fan bird was a hit at
the "Small Steps" Fly-In.**

1/2A FANTRAINER

*A decidedly non-scale, low, inverted pass!
Think all 1/2As are only fair performers? Try
this one!*

SPECIFICATIONS*Type: Ducted-fan trainer**Span: 36 1/2 inches**Area: 195 square inches**Length: 34 3/4 inches**Wing Loading: 17 ounces/square foot**Power Req'd: T.D. .049 or .051**No. of Channels Req'd: 2 (minimum)**Materials: Balsa and ply**Comments: Excellent performance in a small package. Easy to build, but requires attention to detail during assembly, especially when preparing the prop shroud or duct. Uses conventional materials.*

Ace test pilot, Johnny Westbrook, shows great hand-launch form. Note positive climb angle.

by PAUL WILLENBORG

ARE YOU FASCINATED by ducted fans, but unwilling to sink megabucks into a model airplane? Do you want to fly a model jet, but have a small, grass runway? Do you like scale models, but aren't sure you can handle a plane that turns into an air-to-ground missile if the motor quits? If you answered "yes" to any of these questions, the RFB Fantrainer is the airplane for you.

The Fantrainer is small and powered by an inexpensive Cox* TD .049. Construction is very low-tech and, although it's somewhat unconventional, it can be built easily by anyone who has built a few kits. Small fields are no problem, since the Fantrainer is designed for hand launching. Flight characteristics are excellent: It's very fast and aerobatic under power; it's very gentle and has a good glide when the motor stops. Best of all, it's cheap! Most modelers have a TD

The prototype model languishes in the grass before another sortie. Color scheme duplicates that of original full-scale prototype.



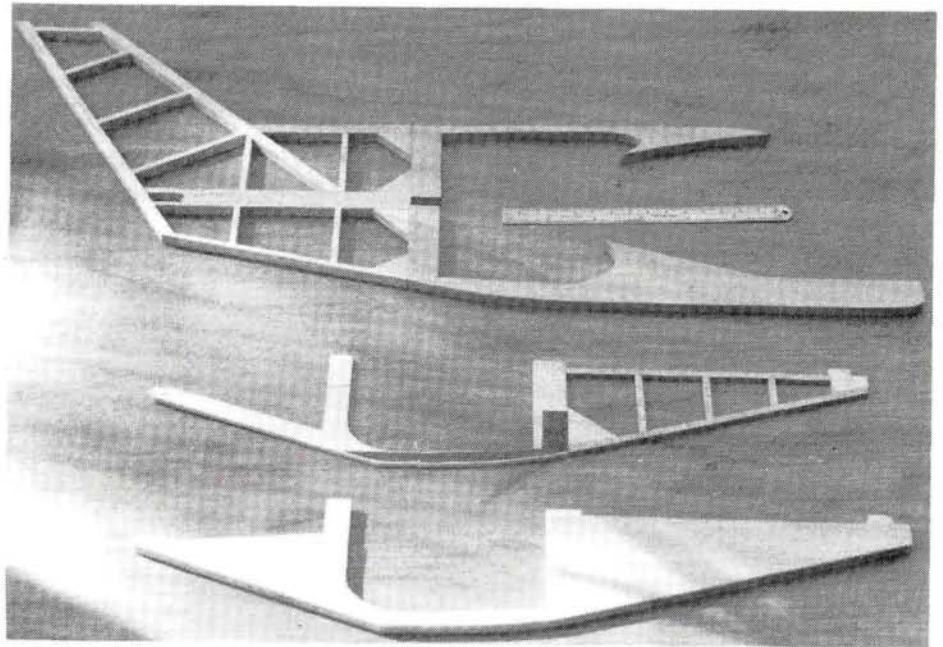
PHOTOS BY PAUL WILLENBORG

1/2A FANTRAINER

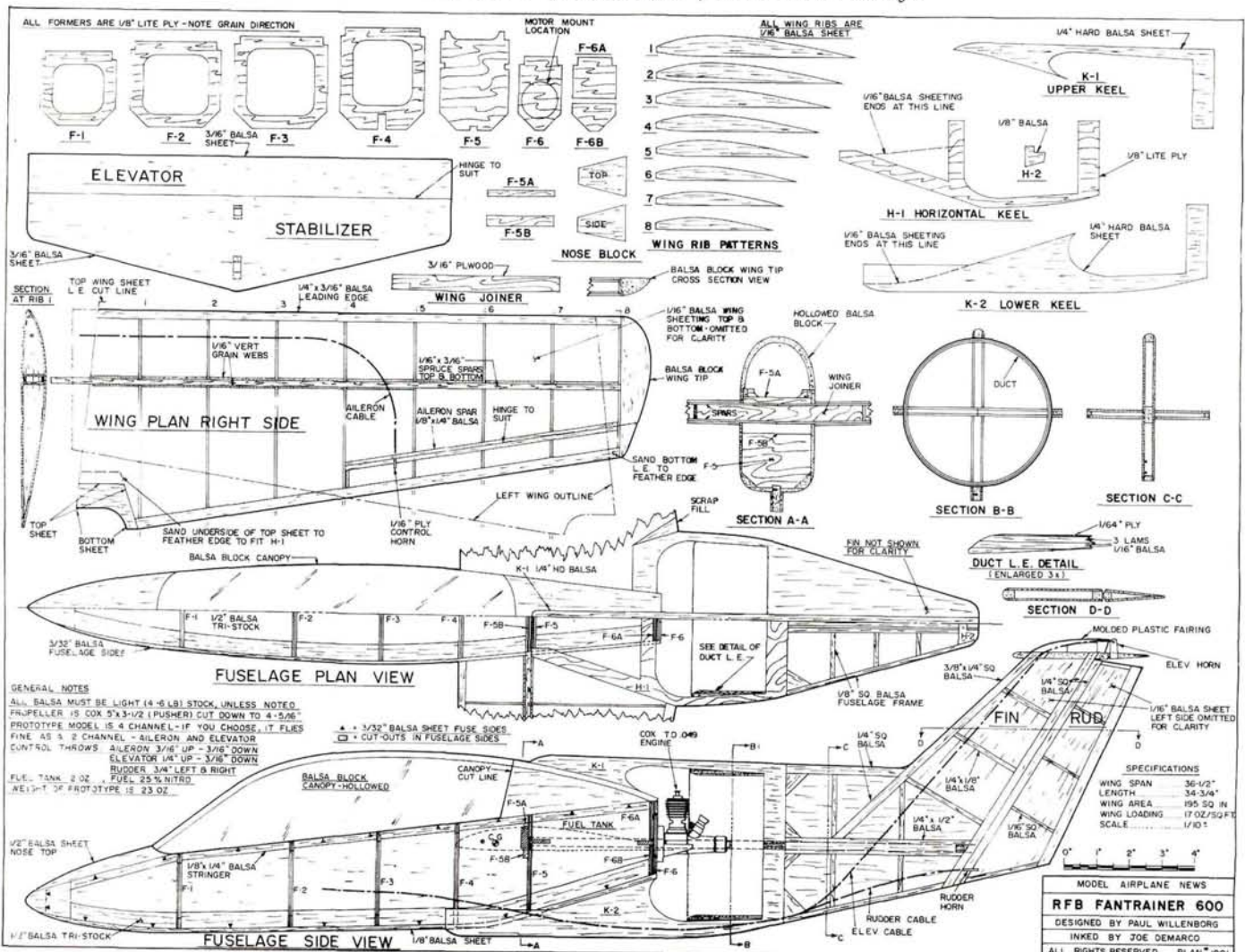
.049 stuck away somewhere, and a lot of wood can come from the scrap box. If you had to buy everything that goes into this model, it would cost approximately \$100, but my prototype cost about \$50.

Building the Fantrainer isn't difficult, but it's certainly very different. Four building features are worth noting:

- A lathe will make the duct construction much easier.
- You'll need an .05-size electric motor to make a starter. (You can probably borrow an old one from someone who runs R/C cars.)
- Part of the plane must be finished with dope and tissue, but don't panic! The parts that require tissue are flat, sheeted surfaces; it's really quite easy.
- Unless otherwise specified, all balsa must be 4- to 6-pound light



Vertical and horizontal fuselage keel assemblies; lower one has been sheeted. Dark area on middle assembly is carbon fiber (found to be unnecessary).

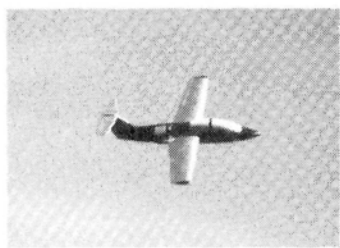


ORDER THE FULL-SIZE PLANS. . . PAGE 140

1/2A FANTRAINER

stock (e.g., Sig* contest stock or similar material). All 1/8-inch plywood is lite-ply, and the sheet shouldn't be horribly warped.

The Fantrainer is built much like a full-size airplane. Various sub-assemblies are completed and then brought together for final assembly. I'll start with the duct, since it's the most difficult part.



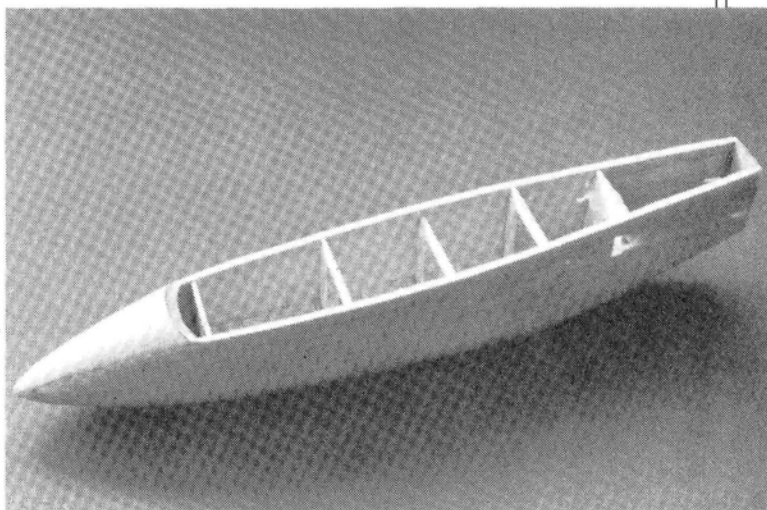
#1901 • 1/2A Fantrainer • \$8.50

Want to experience the fun of ducted-fan flight while keeping costs down? How about a sport-scale model that delivers great performance on a Cox T.D. 1/2A engine? Paul Willenborg's Fantrainer is a well-thought-out, successful model that sport modelers can handle. It uses readily available materials and employs basic model-building techniques. Its performance capabilities best suit it to the intermediate-level flier. Wingspan: 36 1/2 inches; 195-square-inch area. Single-sheet plan.

form. I searched for a bottle this size, but never found one, so a friend turned a wooden form on his lathe for me. It's 1 3/4 inches thick.

Cut a strip of 1/64-inch ply to 2 1/8 x 16 inches with the grain running the short way. Unless you have large ply sheet, you'll have to glue several pieces together, but this isn't difficult if you work on wax paper and use CA with kicker. Be sure to keep it straight! Block-sand one end of the strip to a feather edge. Roll the strip

Duct Construction
The duct is made of 1/64-inch ply and 1/16-inch balsa, which are wrapped around a 4 3/8-inch-diameter cylindrical



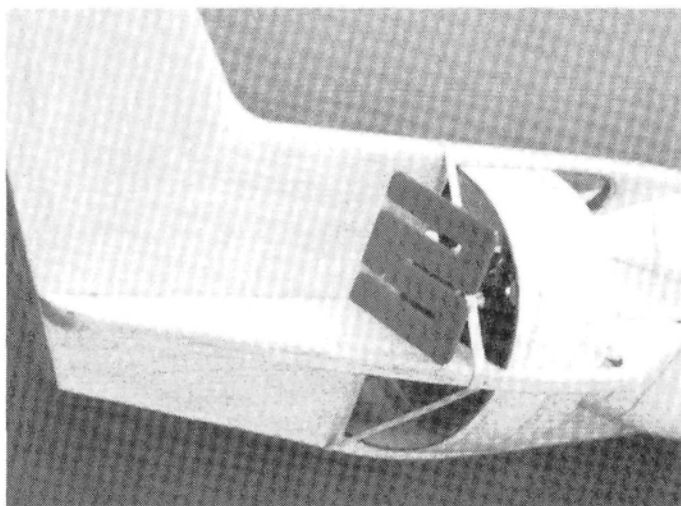
Completed forward fuselage. (Note that one former is short. This has been corrected on the plans).

around the form, starting with the sanded edge. Glue the overlap with 5-minute epoxy and bind it with rubber bands. Don't get glue on the form!

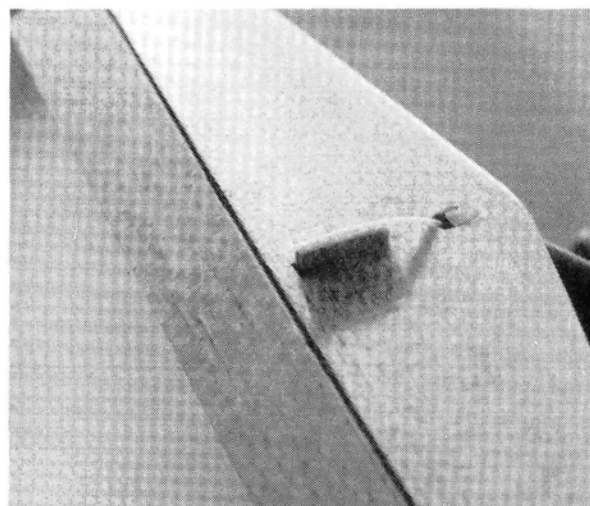
While the ply is drying, cut three strips of 1/16-inch balsa to 2 3/8 x 15 inches, again with the grain following the short side. Butt one end of a balsa strip against the end of the 1/64-inch ply. Roll it around the form, mark the overlap, and cut off the excess. Apply a *thin* coat of epoxy to the balsa, and wrap it tightly around the form with rubber bands or masking tape.

When the epoxy dries, sand the joint to remove the small step caused by the joint in the ply. Glue on two more layers of 1/16-inch balsa, being sure to stagger the joints. Bind each layer tightly and allow each to dry before adding the next layer.

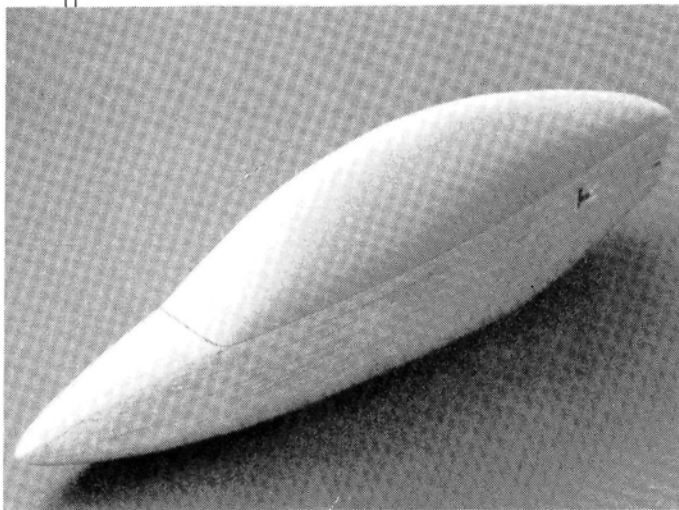
Remove the duct from the form and sand it to the cross-section shown on plans. Note that it tapers to 1/16 inch at the trailing edge. If you used a turned form, it's easiest to do this is on a lathe. It can be done completely by hand, but it's tedious work, and you must be *very* careful. The detailed sketch on the plans shows the lead-



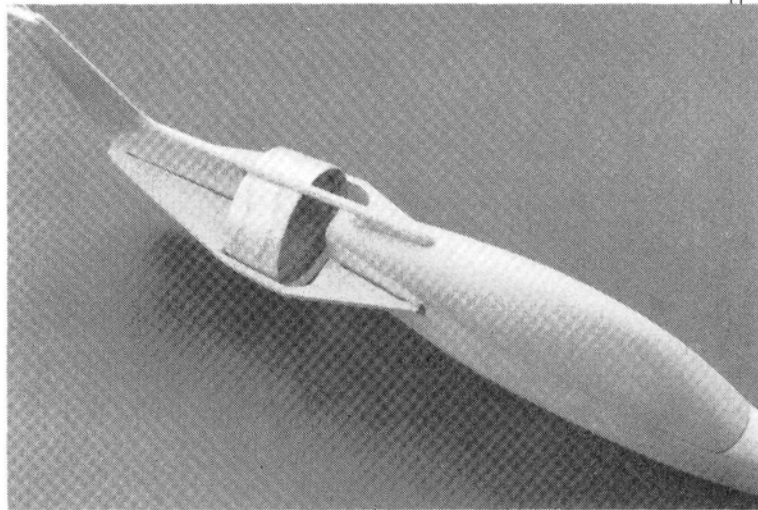
Details of horizontal stabilizer showing nylon pushrod conduit and balsa support. Plastic or balsa fairing added later.



Squaring up horizontal fuselage sub-assembly. H.O.B. up-right tool works well.



Forward fuselage with canopy in place and shaped. Polyurethane foam could be substituted for balsa block. Vacuum-formed clear canopy possible.



Trial-fit of fuselage sub-assemblies. Neatness counts!!

ing edge of the duct. My research on ducted propellers convinces me that a light bell-mouth with a smooth, rounded edge is very important for efficiency, especially at low speeds.

Apply several coats of dope to the inside of the duct. It's a breeze from here!

Forward Fuselage

Cut out the formers, the fuselage sides and the nose block. Draw center lines on the formers, the nose block and the building board, and former lines on the fuselage sides. Also mark the motor-mount location on F6.

Glue $\frac{1}{8} \times \frac{1}{4}$ -inch strips to the top edge of the fuselage sheets. Glue $\frac{1}{2}$ -inch triangle stock to the bottom edge. Severe curves will probably require kerf cuts in triangle stock.

Because the fuselage is flat on top, it's easiest to build it upside-down. Glue F3 to the sides, then add the other formers and the nose block; be sure to keep it all straight. (Again, kerf cuts in triangle stock make it easier to bend.) Note that F5A, F5B, F6A and F6B are installed later,

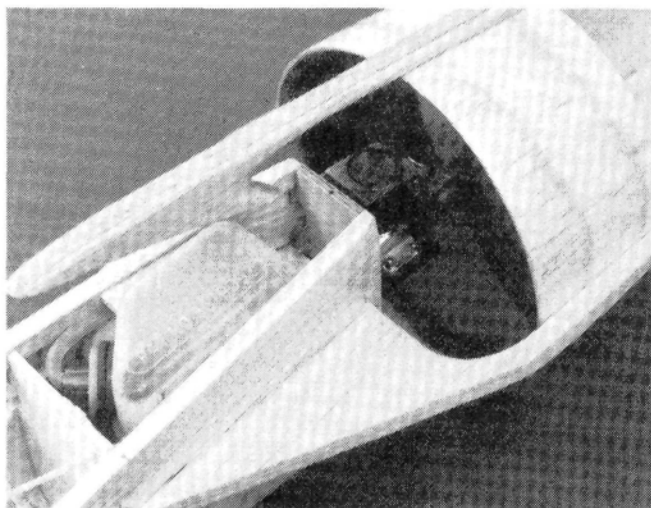
during final assembly.

Add the $\frac{1}{8}$ -inch bottom sheet (one piece, lengthwise grain from nose to F4, and cross-grain from F4 to F6) and the $\frac{1}{2}$ -inch top nose block (sand the curve at the rear of the block *before* attaching). Carve and sand the forward section of the nose block to shape; cut a slot in the bottom sheeting for the lower keel. Cut openings in the sides for the wing spar and the rear fuselage attachment. Drill F6 for motor-mount screws.

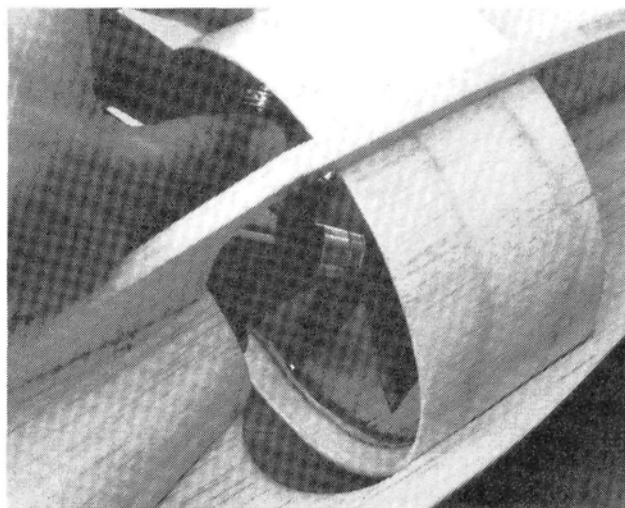
Canopy

This is another tedious part. Start with a $3 \times 3 \times 1\frac{3}{4}$ -inch balsa block. Sand one edge to match the curve of the top nose block. Hold the block tightly in place and trace the outline of the fuselage onto the bottom surface of the block; then draw the canopy on the side of the block. Run the block through a band saw in one direction, tape the pieces together, and cut the other side.

Carve, plane and sand to rough-shape. The front quarter of the block is a simple cylindrical curve; the rest is compound. Carefully check the fit at the nose block,



Fuselage assemblies joined; engine temporarily installed. Sullivan tank installation is tight, but well-planned.



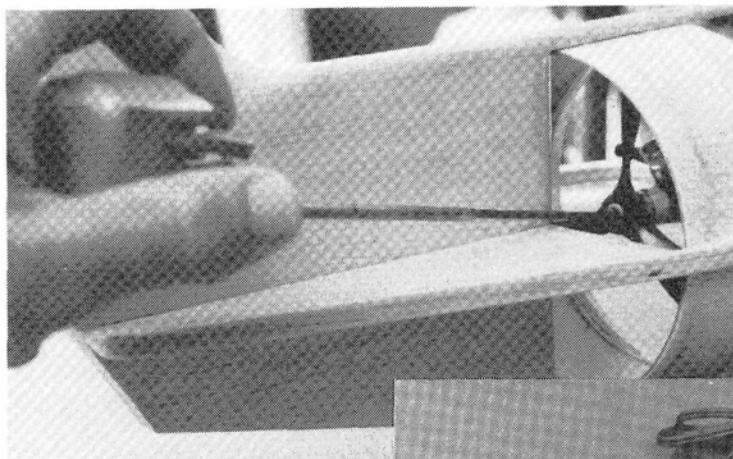
Yes, you really can install the T.D. with the three-blade prop mounted! Small fingers help!

1/2A FANTRAINER

sanding either piece as necessary for a good fit.

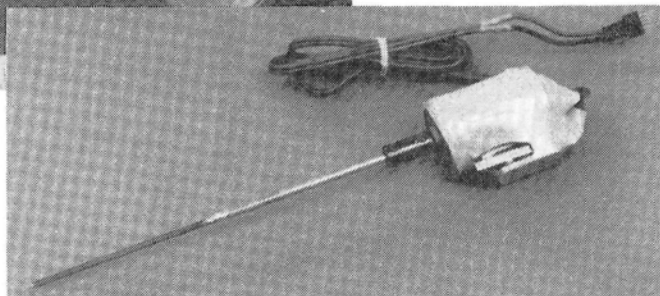
When you're satisfied with the fit at the front of the canopy, tack-glue it into place by putting just a little CA only on the tops of the formers. Sand the rear of the block flush with F6. Block-sand the sides of the canopy so that they fair smoothly into the fuselage. At the front and rear of the canopy, sand into the top edge of the fuselage to get a smooth contour.

Pop the canopy loose, get out your gouge, and start hollowing. Try to thin the canopy until it weighs less than 1 ounce. Mine weighed 8 ounces before hollowing



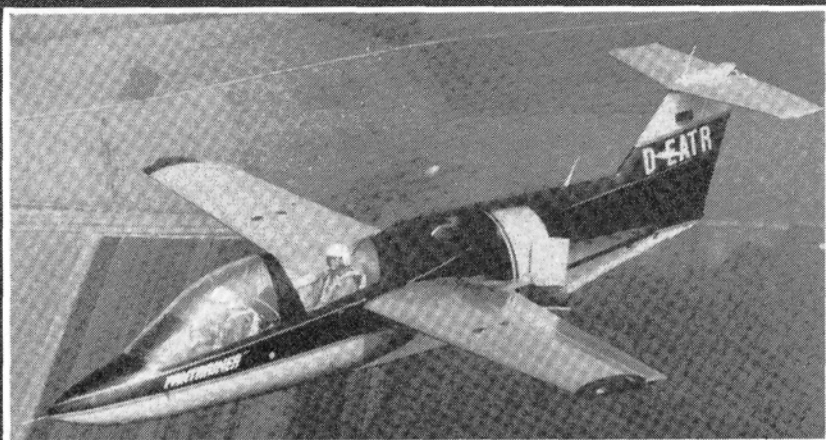
Left: The hex-ball driver soldered to a brass-tube extension provides the length required to clear airframe structure.

Below: Starting system. Microswitch is servo-taped to R/C car motor. Entire assembly is covered with heat-shrink tubing, which is cut away around switch contact arm.



and just a hair under 1 ounce afterward. (Editor's note: An alternative to all that hollowing might be to have it vacu-formed, using your balsa master as a plug.)

SMALL AND SIMPLE—JUST LIKE THE MODEL!



THE RFB FANTRAINER 600 is a small, two-place trainer that's designed to give student pilots a chance to experience jet flying in a low-cost aircraft. It's powered by an Allison C-30 turbine driving a five-blade ducted fan. This powerplant duplicates the main characteristics of a turbojet: lack of torque reaction, minimal trim change at different power settings, and slow deceleration owing to lack of prop drag. The Fantrainer handles very well and is capable of all but the most extreme aerobatics.

RFB claims that the operating cost of the Fantrainer is about one-tenth that of a basic jet trainer, so it's an ideal trainer for small Third World air forces. The first operator of the Fantrainer is the Royal Thai Air Force, which has purchased 47 of these jets. It will be interesting to see how it performs in-service.

In any event, we expect the number of R/C models to quickly surpass the production quantity of the full-size ones, but for the same design reasons: simplicity, low cost, lack of torque reaction, minimal power-trim changes and generally sweet flying characteristics.

Rear Fuselages

The rear fuselages can be built very quickly. For the vertical keel, cut K1 and K2 from 1/4-inch balsa. (Hard stock is acceptable here.) Build the rest of the keel from various 1/4-inch stock, as noted on plan. (See photo for details.) The horizontal keels are built similarly. The forward former is 1/8-inch lite-ply; the remainder is 1/8-inch-square balsa and some 1/8-inch sheet. (Although the photo shows some thin carbon-fiber reinforcement, don't bother with it: I don't think it adds significantly to overall strength, and it's a pain to install.) Sheet both sides of the horizontal keels with 1/16-inch balsa. Note that the tabs on the front are *not* sheeted.

Sheet one side of the vertical keel, and cut a slot in the sheet for the horizontal keel at the fin's trailing edge. Using a Dremel tool and a small router bit, cut slots in the keel for the control cables. Ideally, the slot should be just barely big enough to get the sleeves in. Install the sleeves and sheet the other side.

Sand the edges. Only the top of the vertical keel, the fin's leading edge and the edges of the keel behind the fan are rounded; all the other edges are square.

(Continued on page 70)



Basics of Radio

by RANDY RANDOLPH

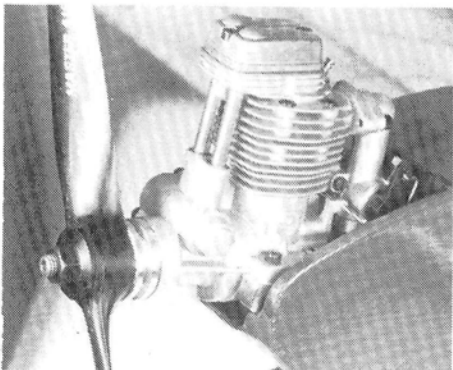
Take better pictures: Documenting and preserving the adventure

EVERYONE TAKES PICTURES of their families and children on vacations, at graduations and at weddings because they want to remember these events. To a lesser degree, the construction and test-flying of an R/C airplane, whether it's the first or the twentieth, is also something worth remembering.

When the kit box is opened, life is beginning for a model aircraft. Why not preserve the memory of that aircraft with a series of photographs taken during construction? Although pictures are easy to take, *good* pictures require a little more effort. There are a few things to keep in mind that will greatly improve the quality of pictures and thereby improve the memory of what's recorded.

A tripod is the key to good, sharp pictures: Nearly any camera with an adjustable aperture and shutter speed will do a good job if it's mounted on one. The single, most preventable cause of inferior pictures is camera movement when the shutter is snapped. A tripod and a cable shutter release will eliminate more than half of all fuzzy-picture problems.

All photographers know that film doesn't record a picture! Sounds funny, but it's true. Film only responds to differences in light, so all pictures are simply records of the light that fell on the film when the camera shutter was opened.



This photo illustrates use of two equidistant lights—one on each side of the subject.



An example of overhead lighting. The reflected light from the plan illuminates the girl's face so that it isn't in shadow.

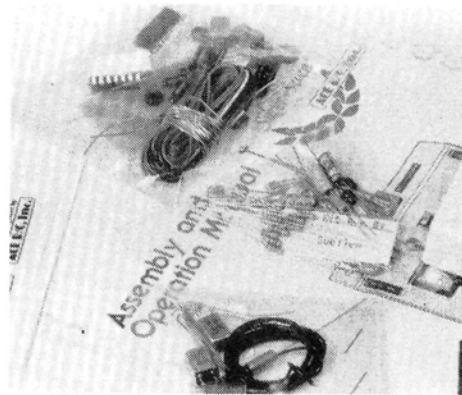
Since light is what makes the picture, knowing how to use a light meter is the first step in producing properly exposed film.

Most of the newest cameras have built-in light meters that register the amount of light coming through the lens. (If your camera doesn't have an internal meter, you can buy an inexpensive, hand-held meter at a camera store.) When the ISO rating of the film is cranked into the camera, the internal light meter tells you what combination of lens openings and shutter speeds will expose the film properly. More than one combination will work, but one will work better than the others (usually, at an aperture setting in the f/8 to f/11 range). Since the tripod holds the camera steady and the airplane under construction isn't moving, the shutter speed can be rather slow and still produce a crisp picture.

One more thing that's very inexpensive and almost indispensable is a Kodak Gray Card. All light meters are calibrated to this gray scale. Place the Gray Card in the same location as the subject and move the camera (or meter) so close that the card is the only thing it "sees," and you'll have

an honest reading of the light that's falling on the subject. Set the shutter and aperture according to the reading taken from the card.

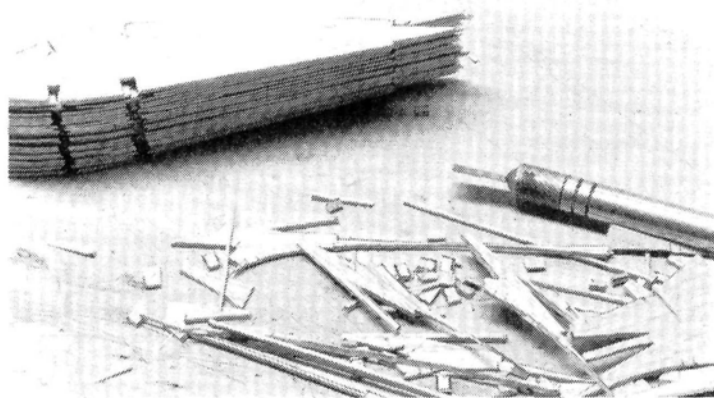
When the camera is set to expose the film, it's time to consider the picture that will result from the exposure. Some pic-



Everything in this picture is enclosed in a clear, plastic wrapper. The use of a polarizing filter eliminated the light reflections from the plastic, so that the contents can be seen.

tures catch the eye and demand attention, while others are passed over with only a slight glance. The reason isn't the subject matter, but the way it's presented. Two things that attract the eye are composition

Control



Here's an example of the "Rule of Thirds." Both items of interest are in the areas outlined by the rule.

and contrast. A picture seems alive if it's correctly composed and has good contrast.

The subject of composition is complicated, but there's one easy rule: the Rule of Thirds. Take a regular sheet of typing paper and draw two vertical lines on it, dividing it into three columns of equal size; then draw two more lines across the page to divide it into three equal horizontal columns. The lines intersect in four places. When taking a picture, place the subject (as seen in the viewfinder) in the area near one of these intersections, rather than in the center of the frame. Move the camera around so you can see the center of the subject in each one of these intersections, and snap the shutter at the one in which it looks best. That's quick-and-dirty composition, but it works!

Contrast is a function of light. A camera's flash usually offers no contrast because all the light comes from the same direction as the lens, and the resulting picture is flat. To add contrast, light should come more from one side so that shadows "mold" the subject. Rembrandt gave his name to this type of lighting, because he placed his subject near a window so that all the light came from one side.

Move the light (or lights) around until the most interesting part of the subject is the best-looking thing in the picture. The main light can come from one side, both sides, above, or even from behind the subject. Try placing one light near the

camera and another nearer the subject; move them around to get the desired molding effect. When everything is just right, take a light reading before you click the shutter. Remember that balsa is almost white and reflects a lot of light, so photograph it against a dark background and use a side light to outline the grain and make it look like wood.

Two inexpensive, discount-store reflectors and 200W bulbs make good lights for black-and-white photography. When color film is used, put a blue filter (80A) over the camera lens, or your pictures will be very red. When using such a filter, you must allow more exposure time, or a wider lens opening, or both. Color pictures for magazine publication are always transparencies (slides), and Kodak's new, high-speed Ektachrome films work very well.

With a small investment in developing equipment, you can develop and print black-and-white pictures at home. This gives you total control of your pictures from start to finish. Color film can also be processed at home, but the investment in equipment, knowledge and care is much greater.

For additional information, Aaron Sussman's "The Amateur Photographer's Handbook" offers a comprehensive introduction to photography. It's easy to read, and it's available in bookstores, libraries, and most professional photographers' private collections! For perfect pics and super slides, keep snapping! ■



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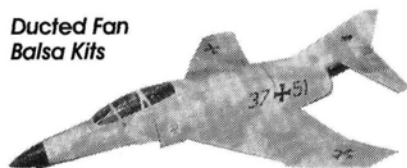
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Floating Around

by JOHN SULLIVAN

Collisions; Refinements—The Ultimate!

A FEW COLUMNS ago, I waxed euphoric about the pleasures of floatplane retrieval; about how serene it was to quietly row out to your floatplane, bobbing on the clear, blue waters. No more, my friends! Last weekend, I rowed out to retrieve a biplane that Bill Curry and I had just flown until it ran out of gas, and then dead-sticked in.

I had the biplane on the boat and was returning to shore when I heard Bill Price, who was flying his twin .40 PBY, yell out that he was coming in. At that point, I was about 400 feet from the shoreline, so I continued to row, thinking that Bill would set down somewhere between me and the far shore. As Bill turned on final, I saw that our paths were actually converging, so I stopped rowing and turned the boat around. Then I started rowing in the opposite direction—*fast!* Finally, I dumped the oars and headed for the bilges.

The PBY made a perfect touchdown, skated about 20 feet and slammed into the left rear side of the boat. One of the guys on shore said that the impact sounded like a Jeep that had been pushed off the fourth floor of a parking garage. When I extricated myself from the bilges, I found the PBY floating along the left side of the boat. The wing was separated from the fuse, and had a chunk the size of your fist missing outboard of the right engine. The



PHOTOS BY JOHN SULLIVAN

MacDanald's Norseman taxis back. After modifications, the plane has become a reliable intermediate trainer.

fuse and the wing were still held together by the servo leads, so I carefully pulled both pieces out of the drink, piled them in the front of the boat and rowed back.

Bill Price was in shock. He said he could have sworn that he had at least 100 feet of clearance. The best analysis anyone could make of the whole incident was that the water was glassy and that Bill had been standing at water level. Between the two, his depth perception never had a chance!

The point of all this is that it's safest to retrieve when all other planes are inactive or flying high. If someone *has* to make a landing while a retrieval is in progress, that plane should be set down well *beyond* the retrieval boat, with the widest possible separation between the two!

The PBY survived the collision and only needed to have a new leading-edge section spliced in, some chunks of foam and new hold-down plates and dowels. That bugger is tough! The boat has a small crease in the aluminum side near the stern, which we'll leave to remind us

of distances, depth perception, deception and such.

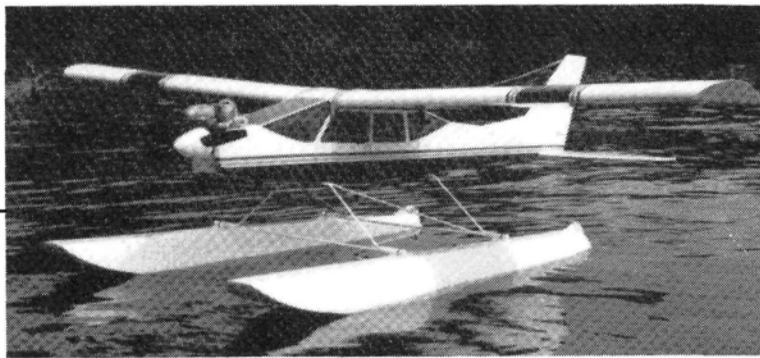
Norduyn Report

Six months ago, I announced an upcoming review of the Unionville Hobbies* Norduyn Norseman .40 Trainer on floats. Alas, that schedule was not to be. Jimmy MacDanald built the plane and finished it on time; however, there were problems, and therein lies the story. The Norseman has a 56-inch wingspan and flies on 36-inch Sullivan Floats with a Saito .45 for power. Covered with MonoKote and ready to fly, it weighs in at 6½ pounds. The kit is rendered in fun-scale and preserves the chubby/ugly proportions of the full-scale Norseman.

Although Jimmy is an exacting builder, he's a beginning flier, so he asked Dick Lemme to take the model up for the first time. The Norseman falls right in between a 32- and a 36-inch float requirement. We chose a 36-inch float, thinking that the short-coupled fuselage might benefit from a pair of slightly long "rails" on the water. (That part we got right!) In prelimi-



Jim MacDanald is smiling now with his Unionville Norduyn Norseman; not so, at first (see text).



Bruce Hall's Midwest Aero-Star .40 on Sullivan floats. Kentucky fliers have dozens of inland lakes for float flying.

nary taxi tests, the Norseman became airborne almost immediately—it flew dead ahead with no problems—so Dick flared back down and taxied back to the starting gate.

The second takeoff was also picture-perfect, and we all thought Jimmy had a



Charley Chambers launches Ed Westwood's new .60 pylon floatplane—the Beast. The quick-build model is an extremely capable flier.

winner...until Dick put the Norseman into a right turn with a hundred feet of altitude. The Norseman rolled into a knife-edge attitude and started peeling around to the left. Dick quickly fed in up-elevator and reversed the knife-edge to bring the Norseman around 180 degrees. He then fed in left aileron to return to level flight, at which point the Norseman again went to knife-edge peeling to the right! All I can say is that I'm glad I wasn't flying, or we would have had a mess to clean up on the far shore! Dick somehow nursed the Norseman back and then found a place to sit down.

To shorten a long story, some of the best minds in float flying (chuckle) came up with the following alterations:

- The ailerons were set up for differential control with $1/2$ inch up and $3/8$ inch down.
- A stationary sub-rudder, equivalent to 20 percent of the fin, was installed beneath the tail group.
- The CG was advanced from 33 percent of chord to 28 percent, and the elevator

hinge line was moved from its scale location of 50 percent of stab back to 33 percent of total stab.

I know that Jimmy didn't enjoy making the changes (nobody really likes to cut up a brand-new plane), but change them he did. A few weeks later, Dick Lemme was back at the sticks.

The Norseman is now a totally different airplane: easy-flying, predictably responsive and smooth for its size. Jimmy flies it full-time now and his first floatplane, a Kraft-Air on 32-inch floats, has been relegated to the rafters. It was probably risky to make all the changes I mentioned at one time; however, serious problems require serious solutions. Besides, I don't think Lemme could have lived through another flight like the first one!

A Sure Thing

This next review plane, on the other hand, couldn't be less of a problem. The Omni Models* Ultimate trainer .60 is right in there with Telemasters and Old-Timer free-flights that almost allow you to do no wrong. Warren Olson, of Pacifica, CA, built the review plane. Warren is an accomplished R/C pilot, and he built the Ultimate trainer because stories he had heard about the plane had piqued his interest. The only changes Warren made to



Warren Olson and friend with Warren's Ultimate trainer .60 on Sullivan floats. Note "landing strip" in background.

the kit was to reduce the dihedral by half, install 48-inch Sullivan floats and upgrade power to a Super Tigre .90.

The Ultimate is covered with Super Shrink Coverite finished with clear, fuel-proof dope. The plane is such a remarkably steady flier that it just might spoil you for anything else. For takeoff, you simply advance the throttle. Turns are practically the same with rudder, aileron, or combinations of both. There's no ballooning or diving throughout the entire speed envelope, and flair at landing is probably the best I've seen. This is the plane used by the R/C flight school in Michigan. The students there have logged 28,900 miles in 1960 flights during the '87/'88 season, with a success rate in the high 90s! You have to build this one from the bottom up, but if any of you out there have grown tired of crashing "trainers," you might consider the Ultimate. This plane is truly job-specific and state-of-the-art!

Floating Mail Bag

Bruce Hall, of Lawrenceburg, KY, called me recently to ask what size float he should use on a Midwest* Aero-Star .40. We deduced that a 36-inch float would easily support the plane, but because of its long fuselage, Bruce wouldn't have a 2-inch bow extension beyond the prop disc unless he moved up to a slightly larger float. A little later, I received a nice letter from Bruce with pictures of the Aero-Star on a bay off Kentucky Lake.

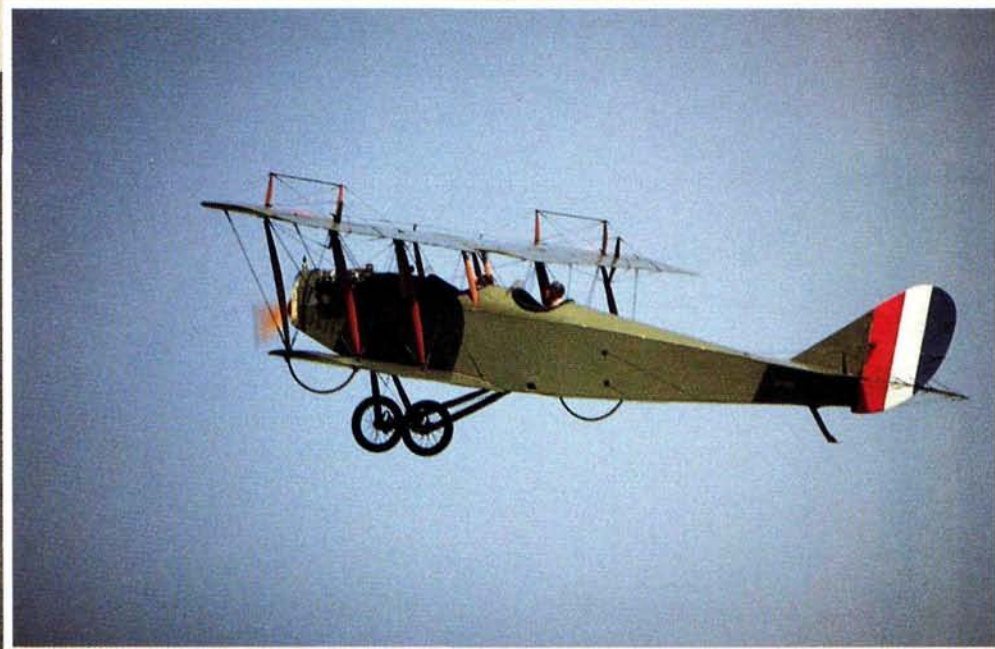
The Aero-Star's foam floats are glassed with 3-ounce cloth, doubled at the step, with West System Epoxy* and a Rustoleum spray finish. Bruce reports that he's sufficiently satisfied with the performance of the Aero-Star to have ordered another set of floats for a .20-size plane in his hangar. This was his first float experience, and Bruce can't believe how easily the plane takes off and lands. On final, it floats forever before touching

(Continued on page 76)

by RICH URAVITCH

THE THEME: JENNIES TO JETS.

THE EVENT? GLASNOST, GRAYNESS—
BUT GREAT GATHERING!



PHOTOS BY RICH URAVITCH

Capturing the theme of Oshkosh '89—the Curtiss Jenny and the Lockheed SR-71.

I REALLY DON'T know how they do it!—the EAA and its relatively small group of volunteers, that is. Each year, they descend on a small city in America's heartland, implement a plan that they've been formulating for almost the whole of

Oshkosh '89

ED CONTROLS

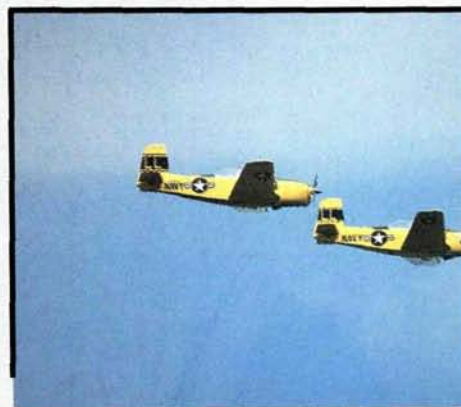
TOMORROW		
PH.	7 AM-8 AM	125 MPH.
PH.	8 AM-9 AM	150 MPH.
PH.	9 AM-10 AM	60 MPH.
PH.	10 AM-11 AM	80 MPH.
PH.	11 AM-12 PM	100 MPH.
PH.	12 PM-1 PM	N.P.H.
PH.	1 PM-2 PM	N.P.H.
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 No Dances, No Stunts, No Maneuvers
 Be Alert For No Radio, Altimeter, No Fuel Gauge
 Double On Tower, Please, Safety - 1000
 Weather Only 1200-6 For Radio Altimeter
"Don't Do Nothing Dumb"

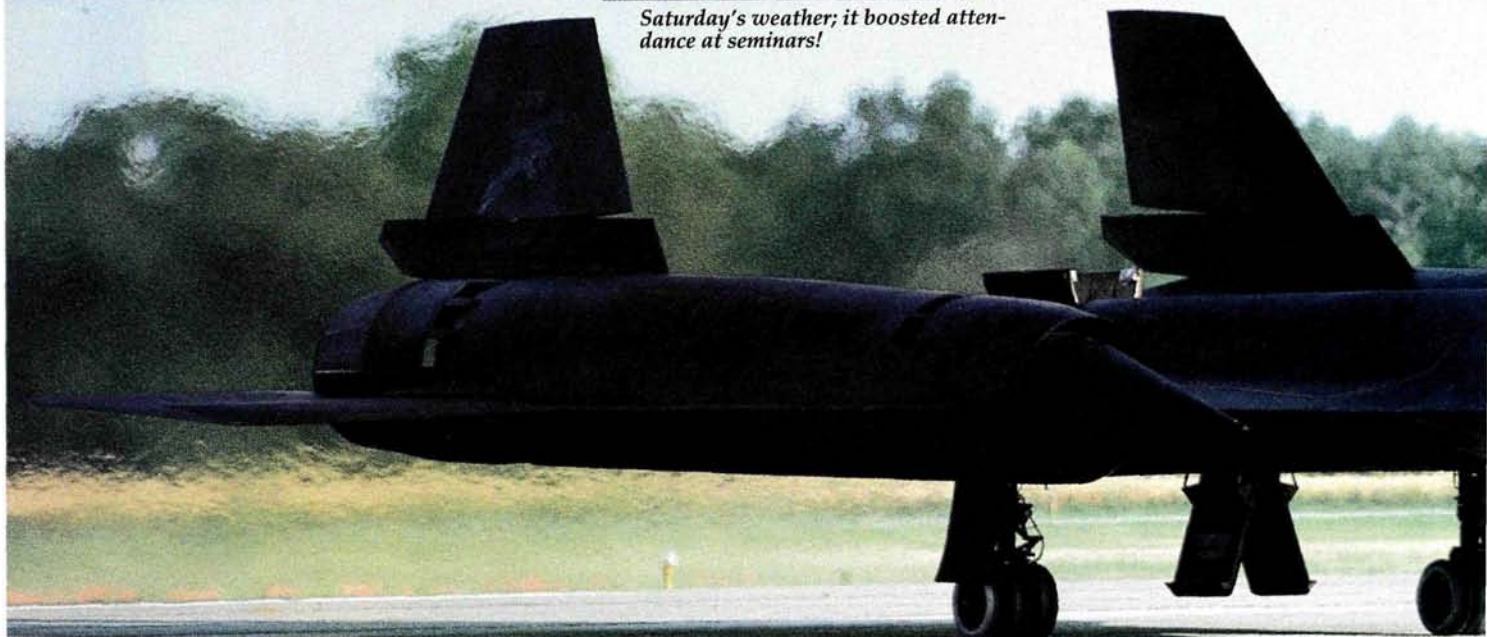
Pattern speeds for demo airplanes were conspicuously posted. Last line says it all!



Saturday's weather; it boosted attendance at seminars!



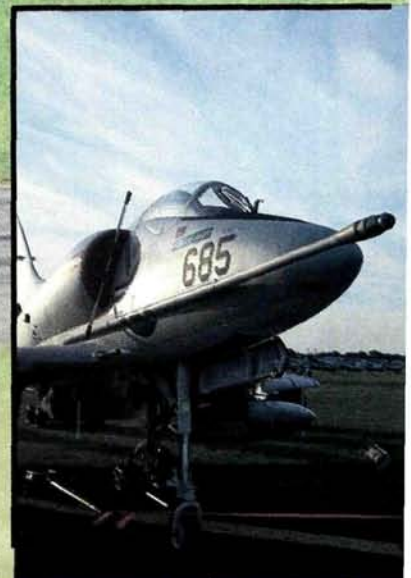
A pair of Beech T-34 squadron-mates.



This picture could have been taken in the '50s. DC-3 in Piedmont livery.

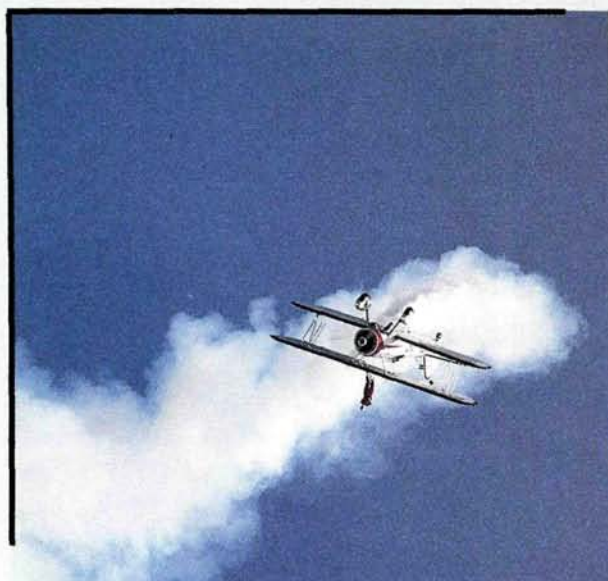


Rare bird: Kal Air Zoo's Grumman F7f Tigercat.



What every collector needs: a perfectly restored, early-series Douglas A-1 Skyhawk. Owned by Combat Jet A Museum.

OSHKOSH '89



Show time! Super Stearman with unusual copilot position! Wish we modelers could get this kind of smoke.



One of six completely restored and operable Jennies—a real treat to see and hear.



The team of Gene and Cheryl Rae Littlefield participated in many of the daily air shows.



The Qantas B-747 gets a little push-back help while event Chairman and new EAA President, Tom Poberezny (Red 3), looks on.

the previous year, and then proceed to choreograph the most spectacular week of aviation activity on the

face of the planet. That may seem to be a slight overstatement, especially considering some of the other long-standing aero events around the world (Abbotsford in Canada; the alternating-year European events like Paris and Farnborough; and a host of other shows), but I'll stand on my judgment: There ain't nothin' else like it...anywhere!

This year's trip to Oshkosh made number seven in a row for me, and I've presented every one on these pages. That still means I missed the first 30 of these events, but I'm catching up! Although I've only attended fewer than 20 percent of the "Oshkoshes," each year brings about something new, and that leads you to wonder what the next year will bring.

This year, much of the "newness" was directly attributable to the present-day world in which



Above: A pair of T-28s awaits takeoff clearance while a T-34 holds short of the active.

Above right: Exciting crossover maneuver performed by the "French Connection" in their CAP-10s.

Right: Daniel Helegoin and Montaine Mallet—the French Connection precision aerobatic team.



(1) Patty Wagstaff executing a slow roll in her Extra 230 Super Bandit.

(2) The meaning of the term "maneuvers" being clarified between a Marine Hornet driver and Miss Oshkosh.

(3) Gene Soucy drove Teresa Stokes around in fine—albeit breezy—style.

(4) Impeccable, highly polished finish of this Ryan/North American Navion typifies the care taken in restoration.

(5) Each day's show opened with a spectacular sky-diving demo by the Liberty Parachute Team.

(6) The very impressive Russian Sukhoi Su-26M flown aggressively and smoothly by Yevgeni Frolov.

Below right: The mammoth Antonov An-124 delivered the two Su-26Ms. Probably enough space left over to take back a couple of F-16s!

Right: "Double Trouble"—one of the prettiest of the many Mustangs at the show.

Below: Warbirds get you comin' and goin'—T-6s comin'; 51s goin'!



we live. Most obvious was the highly visible, very numerous, Soviet contingent, who now seem to recognize, as we apparently do, that the "other guy" isn't really as bad as we may have thought. Discounting all political elements, let's look at what they brought to this aviation "show and tell" and at what they saw.

First, they brought an enormous Antonov An-124, which had enough wheels on it to equip a small fleet

of earth movers. Hidden in the belly of this behemoth were two of the latest high-tech aerobic machines—Sukhoi Su-26Ms—which were designed to compete against the Extra 230 and 300, the Laser and the CAPs.

FEMALE FLIERS...CLOSING THE GAP!!

by RICH URAVITCH

THE annual EAA convention at Oshkosh, WI, has always been the place for a first-hand look at what's going on in the world of sport aviation—which includes home-builts, classic restorations, warbirds and nearly every other imaginable category of airplane.

The daily air shows include flights by many seasoned veterans of the air-show circuit, along with demonstrations by the world's finest aerobatic pilots. In addition to the Soviet Su-26M pilot, Yevgeni Frolov, this year's line-up included the first (as far as I know) demo flight by a world-class woman pilot. Patty Wagstaff, who's from Alaska and a member of the U.S. Aerobatic Team, performed a superb routine in her Extra 230. Her performance clearly showed that she's a keenly competitive individual and an outstanding pilot. The crowd loved her, and if you ever have an opportunity to watch her fly, do it; you're in for a treat!



"...and this is how I perform my knife-edge flight!"



(Continued from page 45)

This aerial hot-rod spans 25.5 feet, and much of its structure employs state-of-the-art carbon fiber, stainless steel and titanium.

One of the highlights for me (and perhaps for him, also?) was my discussion with one of the Sukhoi team about this magnificent airplane. I have a reasonable command of the Russian language and sure did get a big smile from him when we spoke of his "ochen khoroshy samolyot" (very good airplane). I inspected the machine closely and found it outstanding in every detail: from its superb finish to the 45-degree reclining position in which the pilot sits (it allows him—or her—to withstand the -12/+10G loads for which the airframe was designed).

It's easy to see why this is fast becoming a favorite subject with modelers—especially among the "Giant Steppers"! Later on that day, Yevgeni Frolov (one of the Sukhoi design-bureau pilots) put on a spectacular aerobatic display, which included a variety of vertical sequences that looked easy, because the 360hp "round motor" hauled the Su-26's 1,764 pounds around with authority.

In exchange for showing their machinery to aviation enthusiasts who were seeing it for the first time, the Soviets were treated to a sea of airplanes, which they ogled, asked questions about, and touched. I think it's reasonably safe to assume that Oshkosh has no counterpart in the Soviet Union, and I couldn't help but think that their pilots had just a few twinges of envy as they walked around. Even the military hardware was there for them to enjoy. Turn-about being fair play, perhaps the EAA could pull some strings for next year and invite participation by MiG-29s and Su-27s? It's not unthinkable;

the MiGs flew at the Abbotsford show in Canada this year.

In a rare public display, the SR-71 Blackbird did a show on its arrival and was on static display.



Stearmans are everyone's favorites, and this one was particularly striking.

play for most of the week. This airplane is as sinister looking as you're ever likely to see, and when it made its after-burner acceleration runs, it stopped everything that was going on in other parts of the field. It's difficult to believe, but the SR is about to be retired from active USAF service after nearly 25 years of operational use. The latest word, though, is that the mission and the airplane will probably be handed over to the Air National



Every budding A.F. fighter-pilot logs some time in the T-38 White Mouse. Wisconsin Air Guard A-10A in the background.

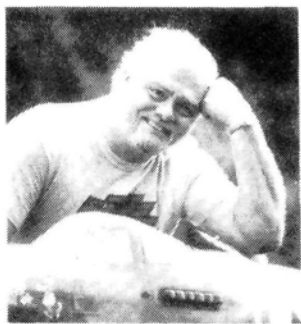
Guard. (This brings new meaning to the expression, "Sleep well; your Air National Guard is awake"!).

Slowing things down slightly (to something just a little faster than the SR-71's taxiing speed) were one half of this year's Oshkosh "theme"—the Curtiss JN-4D Jenny. Fewer than a dozen of these are still flying, and half of that group was on hand. Virginian Ken Hyde organized the participation of five of his fellow Jenny owners (and, undoubtedly, lovers), and they could be seen airborne or on static display throughout the show. This brought to light one of the most interesting aspects of the show: spectators' reactions to the variety of airplanes. The

(Continued on page 86)



Unusual blended strake configuration of the sinister-looking SR-71 is clearly shown here. Note crowd!



Sporty Scale Tech

by FRANK TIANO

AS EACH MONTH passes, I learn more and more about our readers. At the Scale Masters, for instance, I was overrun with questions and comments about this column, and I was quite happy to hear all the remarks, both pro and con. From the letters and the occasional phone calls I receive each month, it's fairly easy to get a grip on just what kind of information most of you are interested in.

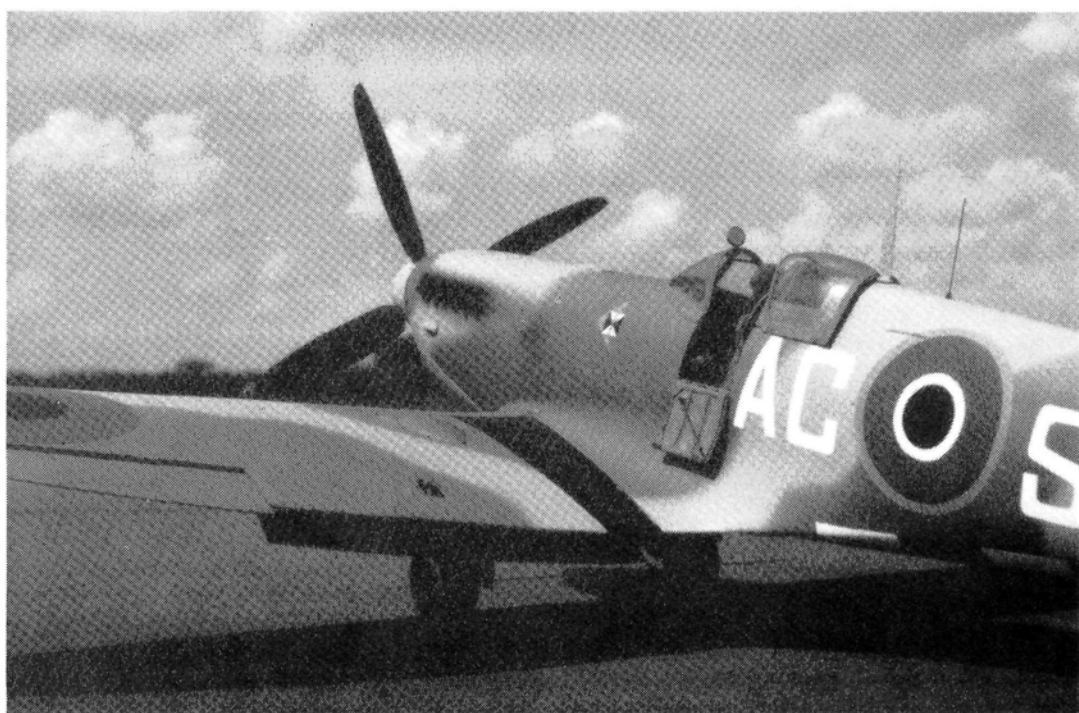
Correct me if I'm wrong, but it certainly appears that you can't get enough information about color chips. It also seems that many of you just love civilian stuff and don't seem to find enough of it in these pages. Some want more contest coverage; others want three-views; still others want kit reviews; and *everyone* wants "how-to" articles! Well here's the poop: This is a scale column, not an entire magazine! I have only so much space in which to report each month, and I have to decide very carefully what I think you might most like to see. Obviously, I blow it once in a while, but there's nothing I can do about that!

The scale movement has certainly taken over R/C modeling, and it's refreshing to see that most modelers want to fly something that resembles a real airplane, not a facsimile of a 2x6! If you really want more scale stuff, I strongly suggest that you write our friendly editor, Rich Uravitch (alias Col. Steve Stunning), and convey your thoughts. A new, no-fooling scale magazine is *not* out of the question, but if you'd really like one with the quality of *MAN*, you have to tell somebody!

As for this column, it's going to stay pretty much the way it is. That means no kit reviews, no three-views and just a little contest coverage. I will, however, continue to present new techniques, new products, reader projects, photos and whatever else fits in a few inches of space.

blue and cream that was shown on the box. He asked the the editor of this other magazine, "How can I find some information that offers a color scheme other than the one that everyone else uses?"

The editor in question had no answer for this poor man! I took it upon myself



John Guenther's superbly executed Spit Mk.IX participated in the First Annual Top Gun Scale Invitational. Details include egress axe located in swing-down entry door.

I'm going to increase our civvy stuff, too! As a matter of fact, the first item on this month's agenda is especially for those of you who don't feel the need to fly Warp 4 and to wipe out entire civilizations with a single burst!

Instant (and Reasonably Priced) Color Chips

While reading another magazine, I noticed a letter to the editor that stated a specific problem. The writer was ready to finish a 1/5-scale Pica Waco, and he just couldn't bring himself to paint it the navy

to mail this modeler all the information he needed, including a copy of the Historical Aviation article that calls out every color scheme of every Waco UMF ever built, as well as the finest three-view you'll find anywhere.

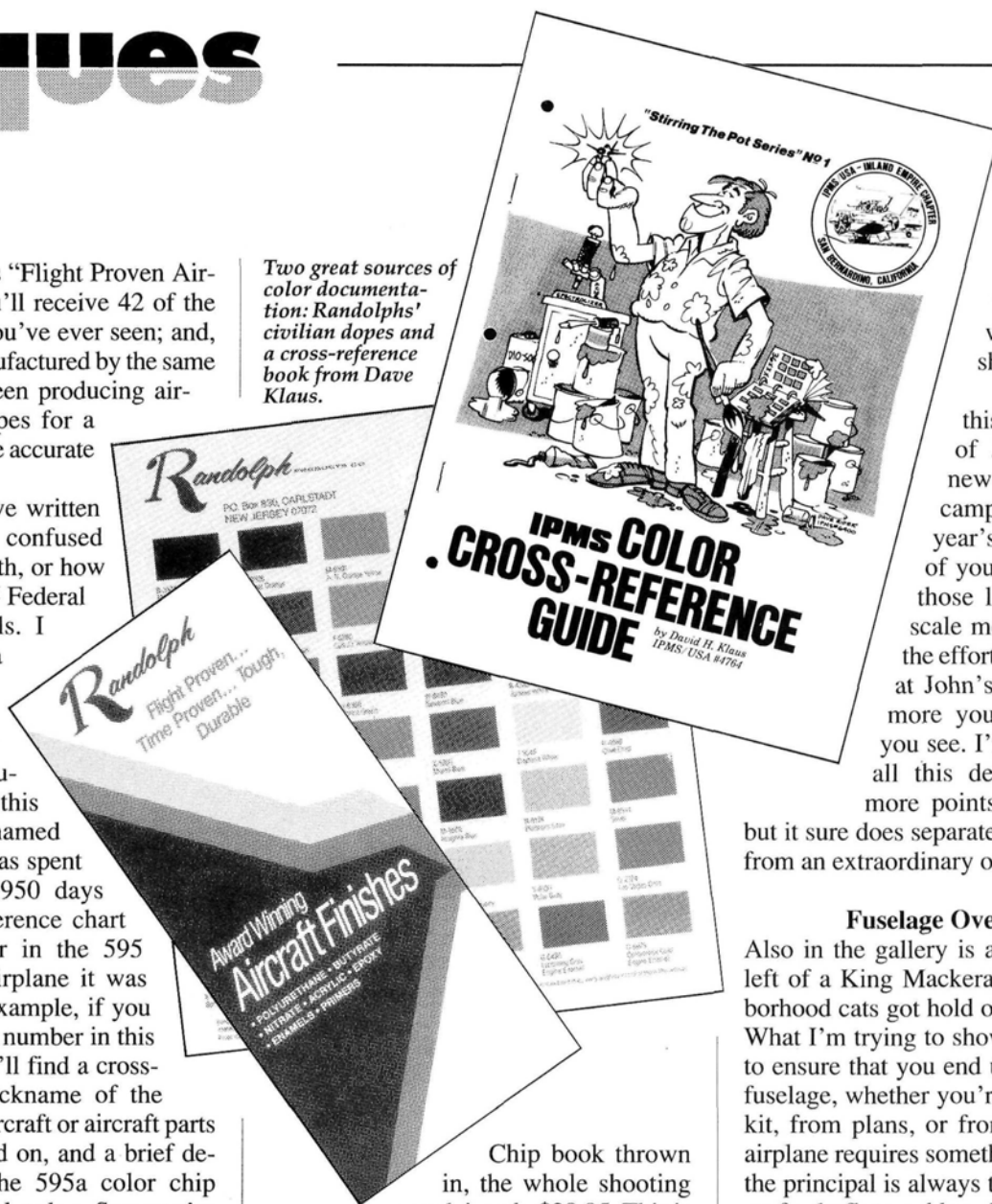
If you need color information for civilian aircraft, and if the names Miami Blue, Ag Cat Yellow, Tennessee Red, Cub Yellow, Diana Cream, Lycoming Grey, or Juneau White ring a bell, here's all you have to do: Send a legal-size, self-addressed, stamped envelope to Randolph Products Co.* Ask for a copy of the color

Techniques

chip brochure for its "Flight Proven Aircraft Finishes." You'll receive 42 of the nicest color chips you've ever seen; and, because they're manufactured by the same people who have been producing aircraft paints and dopes for a skillion years, they're accurate and they match!

Many readers have written that they're totally confused about what to do with, or how to use, their new 595 Federal Color Chip manuals. I addressed this in a previous column, but here's another step in the quest for perfect color documentation: There's this absolute lunatic named David Klaus, who has spent the better part of 950 days making a cross-reference chart that puts any color in the 595 manual with any airplane it was ever used on! For example, if you look up a color chip number in this 170-page book, you'll find a cross-reference to the nickname of the color, a list of any aircraft or aircraft parts that it was ever used on, and a brief description of how the 595a color chip matches the original color. Say you're looking through the Belgium, Post WW II listing (that's right, this is a cross-reference for *every* country!): If you look up color no. 30257, it tells you that its name is Light Earth and that it was used on Tiger Moths, Anson Mk I's, Oxfords and Harvard Topsides from 1947 to 1950! There's also a reference number that tells you exactly where David got his information to prove the color match. I call this guy a lunatic very affectionately, because it takes a special kind of dedication to produce a book like this! This book is called the IPMS Color Cross-Reference Guide, and it's sold direct only. The guide is only \$19.95, and if you want the FS 595a Color

Two great sources of color documentation: Randolphs' civilian dopes and a cross-reference book from Dave Klaus.



Chip book thrown in, the whole shooting match is only \$28.95. This is a great deal for a fabulous piece of reference material, and no scale modeler should be without it.

Keeping Track of Contest Dates

DC Aviation* offers a very special calendar that features some of the finest R/C scale models in the world. Dennis "Mr. F-14" Crooks and his wife, Linda, have snapped some excellent snapshots and organized them into a very attractive calendar. Best of all, this particular calendar offers a great deal of space in which to write important dates, e.g., wedding anniversaries, birthdays, fun flys and scale meets. It's a great gift for flying buddies,

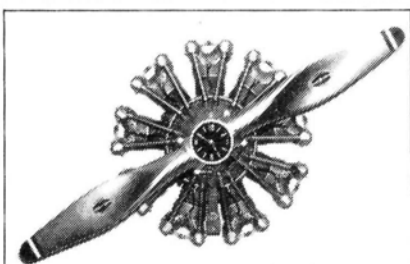
and it will look terrific on the wall of your workshop, den or office.

In the gallery this month is a photo of John Guenther's new Spitfire that he campaigned at last year's Top Gun. For all of you who don't think those little details on a scale model aren't worth the effort, take a good look at John's handiwork. The more you look, the more you see. I'm not saying that all this detail garners any more points in competition, but it sure does separate a ho-hum model from an extraordinary one!

Fuselage Over Glass

Also in the gallery is a photo of what's left of a King Mackerel after the neighborhood cats got hold of it! Just kidding! What I'm trying to show you is one way to ensure that you end up with a straight fuselage, whether you're building from a kit, from plans, or from scratch. Every airplane requires something different, but the principal is always the same. Cover a perfectly flat workbench with a sheet of 1/4-inch plate glass, draw a center line down its entire length, and build your fuselage right on the glass. Keep the entire structure erect and perpendicular at all times using balsa stilts, the bottom of the fuselage, or any other reference point that you can think of. Just Zap the structure right to the glass.

When the entire fuselage is stringered or partially sheeted, simply pop the structure from the glass, and you have a warp-free component! For a fuselage that doesn't have a flat bottom, 1/4x1/2-inch stilts of sufficient height can be glued onto the glass so that they contact the fuselage side crutch piece. This way, the fuselage



Imitari has just introduced an exact 1/2-scale replica of the Pratt & Whitney Wasp Jr. engine with a clock placed in the space normally covered by the propeller cone. The Imitari clock, under authorization from United Technologies, also carries the official registered trademark decal of Pratt & Whitney.

Complete kit: **\$195**, plus shipping
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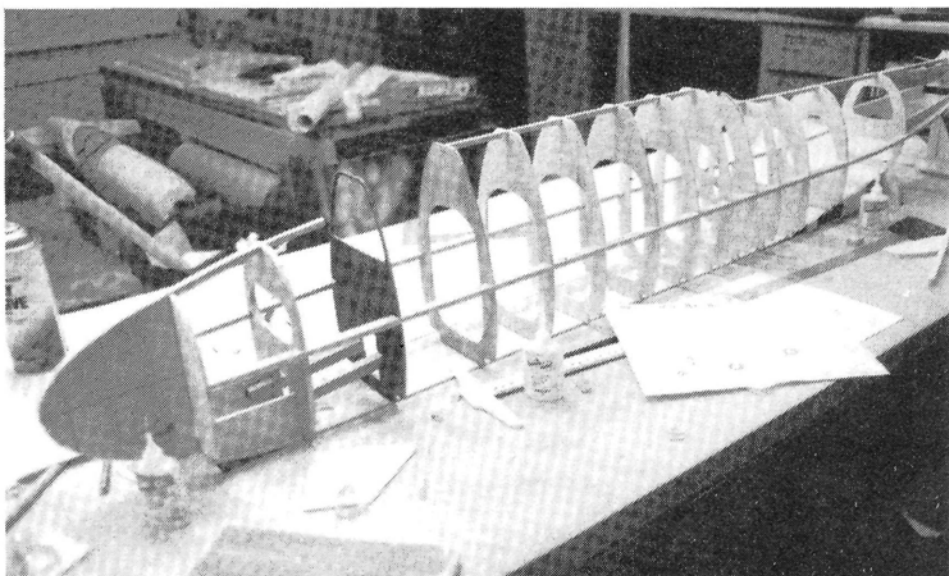
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SPORTY SCALE

is actually somewhat elevated, but so what? If all the stilts are 9 inches tall and each has a mark at the 7-inch point, you could simply Zap the stilts to your side crutch at the marks; this ensures that the crutch is parallel to the workbench surface and in alignment to the center line that you laid down earlier. If you do it this way, measuring everything is a breeze! When it's time to lift the fuselage from

original shape, regardless of how much tension in the opposite direction is placed on it

- a bag of 10,000 fiberglass rivet heads, in assorted scales, for \$5
- more floatplane designs
- more twin-engine designs
- more jet designs
- a one-minute epoxy
- 20-grit sandpaper



The basic framework for Frank's latest project, the Douglas A-20 Havoc. Build-up takes place over a plate-glass surface to ensure an absolutely true structure.

the bench, the stilts are easily removed. You'll also find that setting up a rudder post or setting your horizontal stab is nearly foolproof. All you need are a couple of squares, a ruler and a level.

Scale Needs

I've compiled another list of stuff we need from manufacturers from the mail that you've sent me:

- aluminum wheels with a left and a right half that screw together to capture a tire.
- a retractable tail-wheel unit, suitable for airplanes that weigh 20 pounds and up, that offers more than 90 degrees of travel and is steerable from either end.
- spring-loaded toggle switches for transmitters, bomb/tank drops, etc.
- an on-board device that automatically adjusts the needle valve to prevent a lean run
- an airhorn built into our transmitters that scares the beezes out of us when there's only 2 minutes flying time left in our wimpy battery packs
- 4-inch, semi-flexible, base-loaded antennas for our receivers and transmitters
- bellcranks that have absolutely no slop
- music wire that always returns to its

- a Robart adjustable right-angle drive for the regular Dremel tool and a regular right-angle drive for the battery-powered Dremel
- an inexpensive vacu-former
- four-bladed props

That's it for this month! Before closing, however, I'd like to pass on to you some very important things to remember about this wonderful sport of scale modeling: Norm's new diesel-head conversion for the O.S. Wankel will *not* increase performance; Robart Mfg. certainly is working on a Perpetual Air Pump that automatically refills your on-board air tank as your retract system depletes its air supply; and snap rolls are going to be available, in many sizes, at Dunkin' Donuts by the end of January. Last, but not least, my sources indicate that we don't have any Thaber jets in Key West. If these sources prove to be inaccurate (Stunning is down there checking it out), then, most certainly, check your six!

**Here are the addresses that are pertinent to this article:*

Randolph Products Co., P.O. Box 830, Carlstadt, New Jersey 07072.
DC Aviation, P.O. Box 98, Big Rock, IL 60511. ■

A logical extension to the original concept, this one's designed to survive aerobatic training!

by CHRIS ABATE

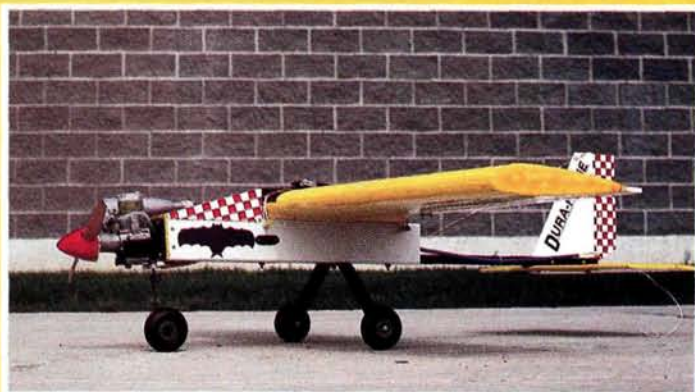
IF YOU'VE EVER found yourself standing in front of a television showing an R/C airplane being purposely "cart-wheeled" on landing just to show its durability and/or how easy it is to fix, I know where you've been: You've been to a hobby trade show and seen Duracraft's* booth. You'll also be familiar with the Duraplane series: Duraplane II; Duraplane ARF; and the Durabat, which is the subject of this review.

Why the name Durabat? "Dura" suggests durability, and "bat" describes its performance in the air. No, it isn't to be flown at night, but it's quick and snappy!

THE KIT: The components come neatly packed and, where necessary, the small accessories are in plastic

bags. There are a few wooden parts, and these are band-sawn, not die-cut. There are no full-size plans, because you don't have to do any real building. You just have to bolt things together, and directions for this are given in an instruction manual, which includes line drawings.

Six pages in the manual are devoted to an explanation of basic aerobatic maneuvers, and drawings of a transmitter show the required stick position for each maneuver. A parts list and a line drawing of each part help with finding the appropriate ones, and the step-by-step in-



DURACRAFT

DURABAT

structions are very orderly. There's a mistake on page 3-21: Figure 3-32, which shows the installation of the steerable nose gear, shows it in reverse position. Everything else was fine.

At the end of the instruction manual, there's a section on "Repairing the Durabat." This contains a table showing each component, its composition (what it's made of), the type of adhesive needed to repair it, and a short description of how to do the repair. The kit also contains a Mylar decal; yep, you guessed it—it says "Duraplane." The fuselage is PVC plastic; the wing is foam; the tail boom is aluminum and there are a few wooden parts. The aileron pushrods are solid nylon rods. Now, on to the building—or what there is of it!

ASSEMBLY: The tail group is pre-cut, sheet balsa and consists of a vertical fin and rudder, a stabilizer and an elevator. That's it! You only have to sand them until they're smooth, cover them, and hinge the movable surfaces. The kit includes a roll of Coverite's* Black Baron Presto Covering for these parts, and that takes care of the tail group.



Exposed engine makes for easy adjustments. O.S. 40 FSR provided more than ample power.

SPECIFICATIONS

Type: Sport

Span: 45 inches

Weight: 5½ pounds (review model)

Area: 400 square inches

Wing Loading: 31 ounces per square foot

Power Req'd: .25 to .45

No. of Channels Req'd: 4

Suggested retail: \$89.95

Features: Unique materials; ARF construction; easily repaired; reinforced, pre-covered foam wing.

Comments: A very back-to-basics type of aircraft that would make a great trainer for someone who wants to learn aerobatic flying. This plane can take a beating!

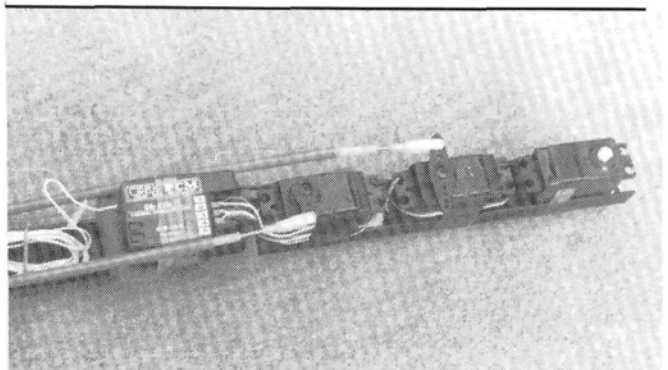
The fuselage is a rectangular piece of PVC plastic and, of course, it houses the fuel tank and radio equipment, but it does this

in quite an unusual way. How is it unusual? Well, let's look at the conventional method. The servos are usually

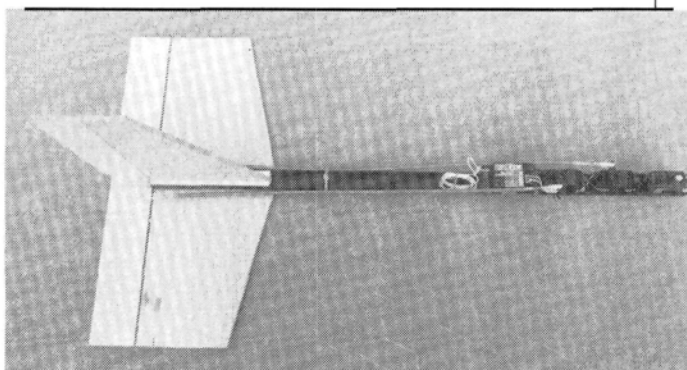
screwed

into servo trays or onto servo rails. Remember that aluminum tail boom I mentioned earlier? Well, it's actually an aluminum channel, and the servos slip into it one behind the other. The throttle servo is first, and it's followed by the rudder/nose-wheel steering servo and, finally, by the elevator servo. The servos are held in place with nylon strapping tape. The receiver is also attached to the tail boom in the same way, but you should put a piece of foam underneath it.

The tail surfaces are attached to the end of the tail boom. The stab is held to the bottom of the channel by two screws that go through the tail boom and stab and are secured with nuts. The vertical fin also slips into the aluminum channel, but instead of gluing it into place, I decided to bolt it on. I used the same method as I had used to secure the stab, but the bolts run laterally. With this setup, if the Durabat crashes, the tail group

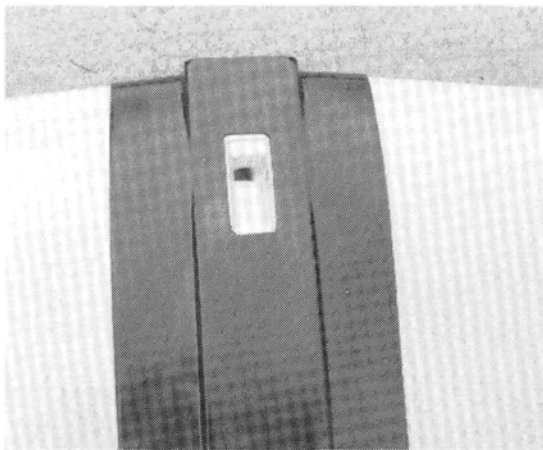


Unique radio installation utilizes tandem servo arrangement. See text for info.

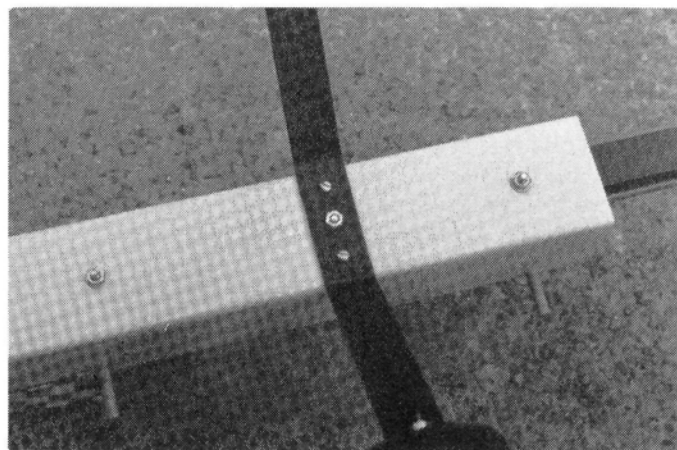


Tail section and boom "housing" servos and receiver are easily removed for repair and/or transportation.

PHOTOS BY CHRIS ABATE



Foam wing with aileron pocket and aluminum spar molded in. PVC molded sheet is glued to top of wing; helps to prevent rubber bands from digging into wing.



View shows the three bolts that hold the aluminum-channel tail boom to the fuselage. Center bolt also holds landing gear; two wood screws aid attachment.

can be unbolted, repaired or replaced and bolted back into place.

The tail boom is attached to the PVC fuselage with three bolts. The holes in the aluminum channel and the fuselage have been pre-drilled, as has the landing gear, which is held in by one of the bolts that holds the channel to the fuselage.

A flat battery pack will work better in the available space; attach it with Velcro to the side of the fuselage. The fire wall is made up of plywood laminations that have been routed along their sides to slip-fit into the front of the PVC fuselage. It's retained by wood screws: one on each side, plus top and bottom. The front of the fuselage has been angle-cut so that engine thrust is preset. To complete the front end, drill holes for the motor mount and fuel lines, and fuelproof the wood with paint or epoxy. Let's move on to the wing.

The wing is of injection-molded foam and is quite strong owing to a metal spar that's embedded in it. Remember the video of the plane being "cart-wheeled"?—need I say more? At the root, the upper part of the wing has a molded pocket for the aileron

servo. That's right!: The aileron servo is *on top* of the wing, as are the nylon pushrods, which are attached to the ailerons. The entire wing is covered with a protective, fuelproof coating. I didn't know what this coating was, so I called the manufacturer. Guess what the name of this coating is!—what else?: Durahide!

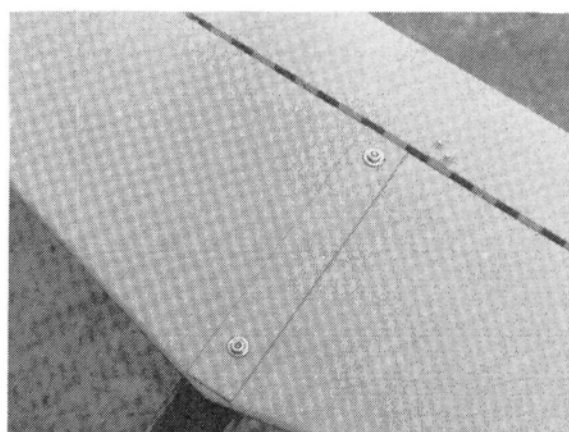
Attaching the ailerons to the wing is relatively easy. Glue the supplied spruce strips to the wing's trailing edge. Carving slots into the spruce can be quite difficult, so to avoid having to do this, I used Robart's* no. 308 hinges. I drilled a 1/8-inch hole in both the wing's trailing edge and the aileron's leading edge (which is solid, sheet balsa), and I glued the hinges into place. If you prefer to use a flexible hinge, I suggest that you replace the spruce with balsa. To fuelproof the spruce strips, I just brushed on a couple of coats of Pactra* Formula-U Yellow, and the match was exceptionally good.

My powerplant is an O.S.* Max 40FSR, just because I happened to have one! Before the Durabat's first flight, I verified that all surfaces correctly followed stick

(Continued on page 88)



Vertical fin is held in place by two 4-40 bolts—plus epoxy for the insecure!



Stabilizer is held by two 4-40 bolts. (Note ply reinforcing.)

ENGINE EVALUATION

SUPER TIGRE X61

Tigers never change
their stripes?
This one has, and
for the better!

by MIKE BILLINTON

SUPER TIGRE'S* MOST RECENT offering for the prestigious International Class of R/C Pattern aircraft (F3A) shows the company's determination to keep to the forefront in this area.

Judged by the test results achieved here, Super Tigre is still in touch with current trends. By lowering the rpm point at which maximum torque can be found, it has accepted the general move toward lower rpm and larger propellers that will reduce noise. After all, failure to meet the FAI sound levels would mean disqualification, while just reducing rpm levels without maintaining a decent flow of power would mean poor competitive results. By lengthening tuned pipes, this latest S.T. X61 can produce high torque at much lower rpm than the S.T. X60 that was tested in 1981.

The differences between the two engines are as follows:

- Exhaust timing is now 154 degrees. (It was 150 degrees.)
- Transfer/boost timings are nominally similar—around 125 degrees and 116 degrees.
- Front induction timing closes a little earlier at 46 degrees. (It was 52 degrees.)
- Crankshaft size, which was 15mm, is up to 17mm with the crankweb full disc now being removed from the crankpin side. This effectively leaves more crank counter-weighting, which is in keeping with the current trends towards a slight increase of "overbalance".
- Crank bore is increased from 11mm to 12mm, though the carburetor bore remains the same at 9mm.
- Bare weight is up from 17.5 ounces to 21.5 ounces, mainly because of a thicker liner and a larger crankshaft.

- A normal lapped piston, ABC-style, is now used. (It was a ringed piston in ABC setup.)
- Combustion chamber is now level with top of liner. (It was a plug-insert style.)
- The cylinder liner now has a much thicker distortion-proof upper flange of .17 inch.
- For a more robust structure, the crankcase is now thickened and widened at lug level by .15 inch.
- The length is now .5 inch less.
- The height is similar, despite the flush head fitting, because the new cylinder head is in Super Tigre's relatively new "K" style, which employs large fins that also overhang the rear exhaust position.

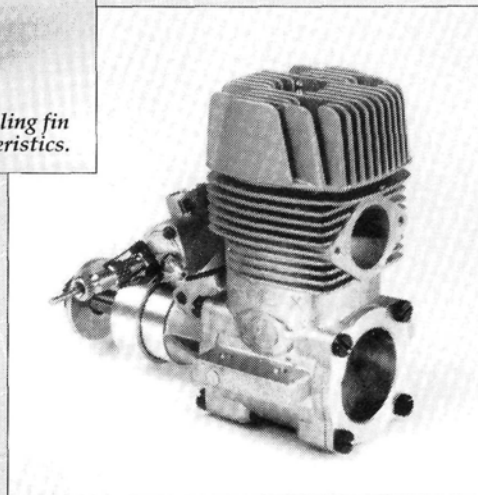
- The exhaust stub is now removable. (Previously, it was one piece with the main crankcase casting.)

- Effective compression ratio is up slightly from 9.2:1 to 9.6:1.

- Finally, after many years, Super Tigre has moved away from its traditional thin-needle valve with a locknut for



The X61 has generous cooling fin area and stable running characteristics.



PHOTOS BY MIKE BILLINTON

The rugged and straightforward X61 should perform well in Pattern events.

main fuel control. It's using a ratchet-style thick needle, which will make most readers happy, because the old style always seemed to be far too sensitive in fuel metering, especially with engines above .29 cubic inches. In addition, they were often non-linear in response and a real time-waster on the dyno.

All of these changes have led to a stronger, more robust and controllable engine, and one in which the vital compression seal at end of the test was quite superb.

After three hours of tests that comprised around 70 separate runs and the more lengthy sound level checks, it was impossible to fault the mechanics of the X61 K. We'll have to wait for a much longer running time out on the field to determine if this design will fall prey to one of the bugbears of some modern R/C aerobatic engines (e.g., rear main-bearing failure after long-term running).

Power Tests

During the test, many propeller rpm checks (as well as the torque/rpm checks themselves) were made using a variety of tuned-pipe lengths. These results were tabulated, and only the Yoshioka 11.5x10.2-inch propeller represented the current, somewhat low, rpm/large propeller operations (the larger 12x12-inch sizes haven't been tested yet). A 13x10.5-inch MK glass propeller was a handful for the S.T. X61, and maximum rpm was recorded as 8,571.

The test results show that the low rpm/long-pipe route for the 2-stroke has yet to give very satisfactory torque figures below 9,000rpm, though some competitors are achieving more success by resorting to individual pipe design. Earlier pipe designs that are fitted at unusually long lengths does lead to long sections of parallel section header piping, and this didn't help the situation.

Some compromise on first divergent cone angle might be called for in the search for the best, low-rpm performance.

Test 1: open exhaust. Five-percent nitromethane with 10-percent caster and 7-percent ML 70 (S.T. no. 1 plug). Compared with the 1981 X60, the torque and hp result now show a considerable rise from 111 ounces per inch and 1.59hp to the new 126 ounces per inch and 2.07hp.

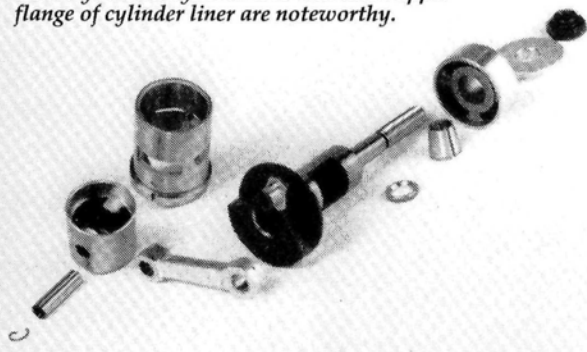
Test 2: OPS quiet tuned pipe set at 422 mm (plug to first max. diameter). Fuel as test 1, plug is now an OPS* 250.

Currently, Super Tigre seems prepared to leave aftermarket sources to meet the need for tuned pipes for its engines, and it's happily pushing the virtues of its PAW, tuneable length mini-pipe-style muffler. So, while most competitors still favor the full-tuned pipe for R/C aerobatic competitions, e.g., the Hatori and O.S.* pipes with flat disc to return the acoustic pulse (rather than the normal convergent rear cone), the available equivalent, an OPS Quiet 60 tuned pipe was pressed into service for the remaining test runs.

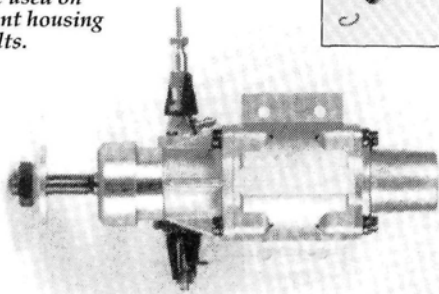
At the 422mm length (arbitrarily chosen to give a peak near 12,000rpm), the torque improvement over open exhaust figures was marked, and it was the highest of the test, reaching 148 ounces per inch. This resulted in 1.81hp at 12,200rpm and an acceptably wide rpm bandwidth from around 11,000 to 13,000rpm—just about right for the Yoshioka 11.5x10.2 propeller.

Test 3: OPS pipe now shortened appreciably to 308mm (same plug and fuel as test 2). Length was arbitrarily chosen in an attempt to force a higher acoustic resonance peak that was close to the open exhaust maximum hp point at

Heavily cut-away crankweb and thick upper flange of cylinder liner are noteworthy.



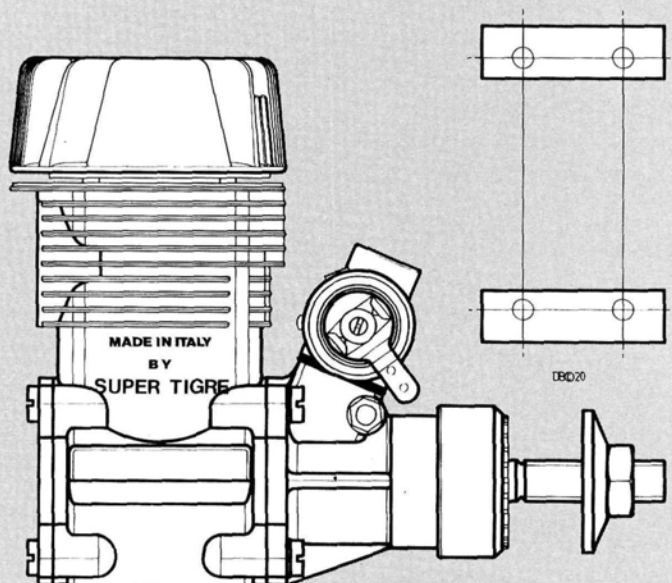
Lock washers are used on front housing bolts.



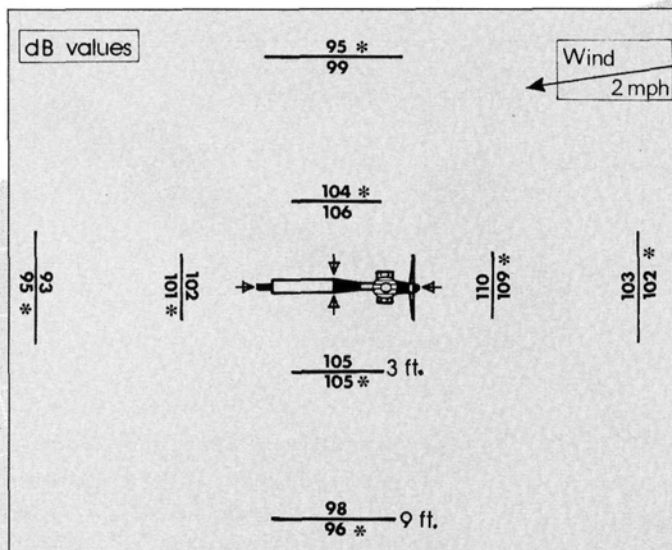
18,000rpm. This proved reasonably successful with the pipe's peak hp now occurring at 17,400rpm and the highest hp at 2.14. Again, this illustrated that, unless the motor is modified, getting the pipe to peak at a similar rpm point to where open exhaust achieves its maximum hp usually produces the best pipe hp result; the pipe torque, however, is usually reduced. Test 2 shows that the use

of a tuned-pipe length to cause the best resonance approaching open exhaust highest torque point usually yields the highest torque also. There are exceptions to this but, in general, it's logical, because operated at the relevant lengths, the pipe usually enhances the normal open exhaust efficiencies, be they torque or hp values.

Test 4: OPS pipe lengthened considerably to 510mm (plug and fuel are the same as test 2): In an attempt to force the best resonance point to the even lower rpm that are occasionally used in R/C pattern (i.e., around 9,000rpm or below), this length made it down to 9,200 rpm where a good



40% FULL SIZE



Engine: Super Tigre X61 K R/C Aerobatic

Equipment: OPS quiet tuned pipe at 510 mm* and at 422 mm

Fuel: 5-percent nitromethane, 78-percent methanol 10-percent castor and 7-percent ML70 synthetic oil

Engine position: 3 feet above hard earth surface

Temperature: 70 degrees F

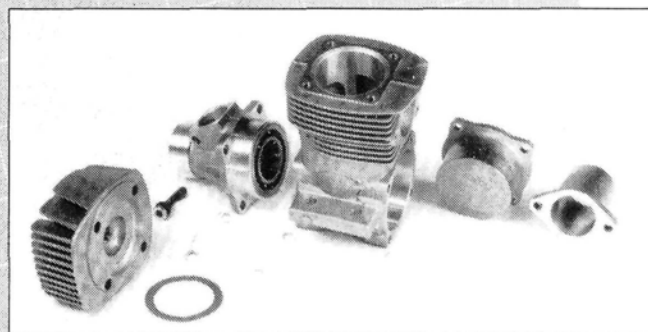
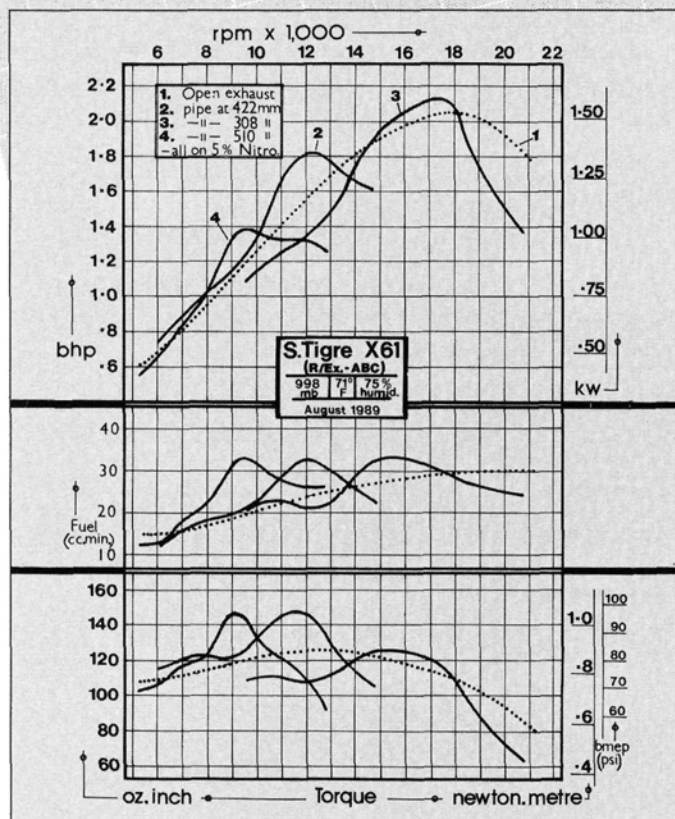
Humidity: 74 percent

Propeller: 14x8 Airflow,* 11.5x10.2 Yoshioka

Mean rpm: 9,200*, 11,400

Sound meter: Radio Shack 33-2050 set at a 3-foot height, pointing horizontal at nearest point of sound source (at 3- and 9-foot distances)

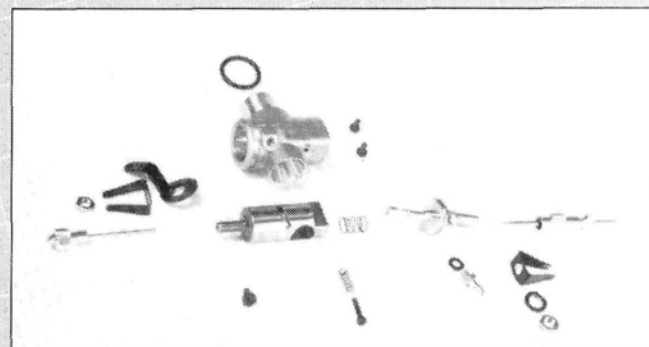
Meter settings: "A" scale and "slow" response



CNC machinery now used on Super Tigre internal parts. Castings are substantial and front housing is commendably short.

torque of 147 ounces per inch was recorded. Indications are that this was, nevertheless, below the best compromise operation point for the X61 that resulted in a low hp of 1.39.

Reading all the signs correctly might suggest that a tuned-pipe length of 400mm that gives a peak around 13,000rpm will cope best with the conflicting points of propeller size and hp generation, but since lower rpm comply with the noise restrictions, pipe length will probably be unusable in regular FAI competition.



Secondary needle for idle and mid-range is at left and Super Tigre's new main needle valve with ratchet lock device is at right. Carburetor bore is 9mm in diameter—quite small by recent standards.

Sound-Level Checks

With the engine undisturbed and the whole dyno rig taken outside the test room, two sets of Db figures were recorded, as shown on the graph. The first lot used the 422mm pipe length and that Yoshioka propeller, which is fairly typical equipment. The second set of Db figures attempts to record the outcome of operation at long pipe length and larger propeller. The propeller concerned isn't typical of the size used in actual competition, but it was available and selected to allow the 9,000 rpm peak.

Anomalies do exist; the low rpm findings showed less Db drop than might be expected. The higher sound levels from the propellers are noteworthy and, arguably, the bigger propeller may have been the cause. At the exhaust outlet, the bizarre finding that lower rpm and a bigger propeller gave 2Db more sound when at 9 feet seems unusual and may be a spurious result.

The figures are near to the FAI requirements of 98Db at 3 meters measured at right angles to the engine, so the dyno might just get a pass to fly. Remember that the conditions of these Db tests are unlike real model situations, and in this

SPECIFICATIONS

Capacity:	6078 cubic inches (9.959cc)
Bore:	.9453 inch (24.01mm)
Stroke:	.866 inch (22mm nominal)
Stroke/Bore ratio:	.916/1
Timing periods:	Exhaust 154° Transfer 125° Boost 115° Front Induction opens 32° ABDC closes 46° ATDC Total 194° Blowdown 14.5°
Exhaust port height:	.276 inches (7.02mm)
Combustion chamber volume:	.92 cc
Compression ratios:	Geometric - 11.8/1 Effective - 9.6/1
Cylinder-head squish:	.019 inch (.48mm)
Squish angle:	2°
Squish-band width:	.167 inch (4.26mm)
Crankshaft diameter:	.669 inch (17mm)
Crank bore	.475 inch (12mm nominal)
Carburetor bore:	.9mm
Crankshaft nose thread:	.312 inch x 24 TPI (⁵ / ₁₆ UNF)

Crankpin diameter:	.275 inches (7mm nominal)
Wrist-pin diameter:	.236 inches (6mm nominal)
Connecting rod centers:	.41mm
Length:	3.9 inches (99mm)
Width:	2.49 inches (63.25mm)
Height:	4.13 inches (63.25mm)
Width between bearers	1.66 inches (42.17mm)
Mounting holes	50x20x4mm
Frontal area:	7.2 square inches
Overall weight:	21.4 ounces (608 gm)
Piston weight:	.40 ounce (12 gm)
Crankshaft weight:	3.2 ounces (91 gm)

Performance

Max. BHP	
2.14 at 17,400 rpm	(OPS quiet-tuned pipe at 308mm/5% nitro)
2.07 at 18,000rpm	(open exhaust/5% nitro)

Max. Torque	
148 oz/in. at 11,600rpm	(OPS pipe at 422mm/5% nitro)
126 oz/in at 12,800rpm	(open exhaust/5% nitro)

RPM on standard propellers:

	Open Ex.	Pipe at 308mm	Pipe at 422mm	Pipe at 510mm
14x7 Graupner	8,064			
14x8 Airflow				9,150
11.5x8 McGregor	9,557		10,015	1,998
13x6 MK (glass)	10,625		11,241	
11.5x10.2 Yoshioka		10,210	11,608	
10.5x6 McGregor	12,200		12,773	
12x6 Graupner	12,541			
11x6 Graupner	14,058	14,392		
10x6 MK (glass)	15,199	15,726		
10x4 Zinger	17,866			
10x4 Taipan		18,040		

Performance Equivalents:

BHP/cu. in.	3.52
BHP/cc	.215
Ounces inches/cu. in.	243.5
Ounce inch/cc	14.8
Gm meter/cc	10.84
BHP/pound	1.6
BHP/ kilo	3.52
BHP/sq. in. frontal area	.297

Manufacturer:

Super Tigre SRL,
Bologna, Italy

Distributor:

Great Planes Model Distributors,
1608 Interstate Dr., P.O. Box 4021,
Champaign, IL 61820.

particular case, one might think that the Hatori and O.S. pipes mentioned would give a less obtrusive sound output than the OPS divergent/convergent cone-pipe style, and would therefore, meet the sound restrictions more easily.

As more information is collected, it's hoped that a pattern will emerge, even if it's one that says the exercise was of marginal merit! It was a change to run the engines outdoors anyway; they're so much more intimidating in an enclosed space. In fact, next time around seems a good opportunity to do the Db sound-level checks indoors first and then to repeat the exercise outdoors to check the effect of acoustic reverberation and its likely increase to sound levels.

Idling Performance

Using the Yoshioka 11.5x10.2-inch propeller, pipe at 422mm, pipe pressure feed with fuel level ¹/₄ inch below fuel jet and fuel/plug (the same as in torque tests) led to 20 minutes of knowing how to get the idle and mid-range response correct. It was then a classic case of, "if all else fails, read the instructions," and the S.T. X61 came up smiling with a easily achieved idle of 2,000rpm with a possible 1,800rpm, together with precise pick-up to maximum rpm. All of this was without resorting to Super Tigre's optional realignment of spraybar that the company offers as a way to cope with some individual engine/application differences.

(Continued on page 106)

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QUIET FLIGHT

(Continued from page 21)

"Harley's Hinges (the special latex rubber packaged by Ace R/C*) are used to butt-fit flaps under a little tension. The flaps pivot at their edges, so they needn't be spaced, rounded, or beveled for deflection. The tension and sealed fit contribute to flutter control and reduce drag. The rudder is also rubber-hinged.

"Fin and rudder are solid 'contest' balsa. Panels are D-tube construction with vertical balsa webs placed flush with the rear edge of the spars. For extra rigidity and strength, vertical caps of 1/32-inch ply were added over the spars and the balsa webs.

"This fuselage is a narrow ply box with solids added and shaped. The fuselage, fin and moving surfaces were glassed and painted. For similar construction details, see the plans for the 'Keetah,' which were published in the June '89 issue of RCM.

"Gull stab: This is of 1/8-inch balsa, top and bottom, over a 1/64-inch ply core. A curved jig was made, and a bottom sheet for one half pinned and clamped to it and then sprayed with accelerator. Slow CA was then applied to the pre-shaped, ply, core half and pressed down. The top sheet was similarly pressed on, and the halves were trimmed to the core's outline and joined. After sanding to an airfoil, the central areas were cut out to lighten, and ribs were added.

"Specifications: Span: 124 inches; wing area: 1047 square inches; aspect ratio: 15.2:1; weight: 63 ounces; wing loading: 8.67 ounces per square foot.

"Where floaters would be best, a Roto-Flap ship should excel with a lighter than usual loading. In gusty conditions, it should penetrate well, unballasted, by reflexing the extended flaps. If desired, ballast tubes could be built into the panels during construction. To increase weight, a heavy, 5/16-inch, steel rod could be substituted for the carbon-fiber rod."

Harley made one demo flight at the Nats, and the model seemed to fly quite well. He'd like to contact some experienced scratch builders who'd like to try out the Roto-Flap concept. For an information packet, send \$3 and a self-addressed 9x12 envelope to Harley Michaelis*, and tell him that you heard about it in MAN.

Falcon 880

I also saw the Falcon 880 (which was designed by Mark Allen) at the Nats, and

I had previously seen it fly at a slope race in Southern California.

As well as being an extremely attractive model (a term I don't usually apply to a model with the Schumann planform!), the Falcon 880 is a great flier. I don't think any of the ones flown at the Nats placed high in the final standings, but I do remember that they were the kind of models that got your attention. They look right, and they seem to handle a variety of conditions very well. I think their small poly tips really make these models look distinctive.

When I saw the model fly at a Hughes Hill slope race, I was impressed with its speed capability. Daryl Perkins flew it to 1st place against many slope racer designs, and although he's a very smooth flier, without a good ship that can really get up and move, you don't win slope races. When the lift was light, the Falcon had the advantages you'd expect in a thermal plane. When the wind blew more strongly, Daryl just added ballast and kept on truckin'. The harder the wind blew, the faster he went. The Falcon is definitely an all-around aircraft.

You say you must have one? Easy! They're available from Flite Lite Composites* for \$175, or \$275 with a pre-sheeted wing. The kit includes a one-piece epoxyglass fuselage that's reinforced with Kevlar, a pre-fitted canopy, and 1.5-pound-density foam-core wing sections.

Specifications: Span: 112 inches; average wing chord: 7.86 inches; wing area: 880 square inches; aspect ratio: 14.25:1; airfoil: S3021-S3014; weight: 60 ounces; wing loading: 10 ounces per square foot; control functions: rudder/elevator/aileron/flaps with crow for glide-path control. I don't know about you, but I *must* have one!

Next time, I'll discuss the possibility of another project; I'll take one off the shelf kit and "improve" it; I'll take some time to figure out what would be a good model—one that many people will enjoy.

Till next time...good thermals and a full charge!

*Here are the addresses that are pertinent to this article:

Ace R/C, Inc., 116 W. 19th St., Box 511C, Higginsville, MO 64037.

Harley Michaelis*, 26 S. Roosevelt, Walla Walla, WA 99362.

Flite Lite Composites, P.O. Box 1493, Windsor, CA 95492



Left: Ken Myers: best laps, 8; best thermal duration, 4:54 on 26-second motor run.

Middle: Dieter Lamprecht: best laps, 10; best thermal duration, 4:58 on 21-second motor run.

Far left: Hatch Manell: best laps, 12; best thermal duration, 5:00 on 28-second motor run.

by JOHN LUPPERGER

NO CHEAPIES HERE! The Second Bi-Annual F3E 7-Cell Contest is highly specialized, and most models cost between \$500 and \$1,000. On August 19 and 20, 13 pilots gathered to do battle, and although this might not seem like a large turnout, you have to consider the nature of the event.

Of the 13 entries, only four had been built from kits, and only two of these had actually been designed for this type of event. The other nine entries had all been scratch-built and designed

Cell-limited, FAI, task-oriented electric meet with great prizes up for grabs

specifically for the contest.

As was the case in the first contest two years ago, Felix Vivas was the organizer, and the Harbor Soaring Society of Costa Mesa, CA, was the host club. Felix obtained cash donations of \$500 each from Airtronics Inc. (Irvine, CA) and House

SECOND BIENNIAL F3E 7 CELL CONTEST



The winners (from left to right): 1st, Jason Perrin; 2nd, Bob Sliff; 3rd, Matt Poleking; and 4th, Jared Stalls.

Left: Scott McKenzie: best laps, 4; best thermal duration, 4:35 on 43-second motor run.

Middle: Tom Copp: best laps, 12; best thermal duration, 5:06 on 16-second motor run.

Right: Matt Poleking: best laps, 14; best thermal duration, 5:01 on 16-second motor run.



PHOTOS BY JOHN LUPPERGER



Seven-cell F3E models are quite small and move quickly. If you gain altitude in a thermal, you don't take your eyes off of them—not even for a second.



"Dual plane" sighting devices used to determine when a competitor has completed a lap. Electric buzzer, used to give "turn" signal.

of Batteries (Costa Mesa, CA), which is owned by Bill Lusk. Felix supplied another \$1,000 to round out the total prize money to \$2,000—that's right!: \$1,000 for 1st; \$600 for 2nd; \$250 for 3rd; and \$150 for 4th. Hobby Lobby donated a Sinus Kit that was presented by a drawing of the names of the pilots who didn't win any cash. There were also several Mini Challenger Deluxe kits from Astro Flight, wines, and a \$100 bill for the helpers, so this was quite a "rich" event!

During this event, the tasks are the same as for the International FAI F3E event, but pilots are limited to using seven cells of 1200mAh capacity; and a "round" actually consists of completing three tasks in one flight.

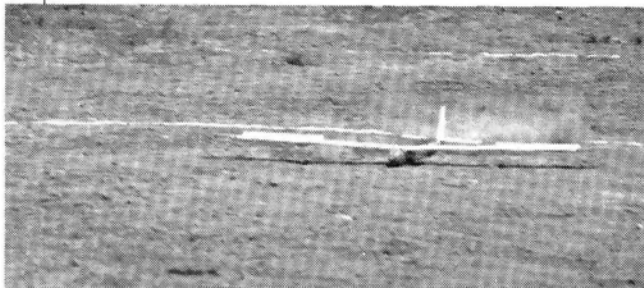
First, pilots complete laps on a 150-meter course. This is accomplished within 3 minutes of launching. To gain altitude, pilots may run their motors as long as they like, but they can only complete laps during motor-off glide. A minimum of two climbs must be executed, and there should be at least one additional lap on the second climb to avoid a 30-point penalty. Each lap is worth 15 points.

At the end of a pilot's lap time, he has 1 minute to pass through a 10-foot-high gate and start his thermal-duration flight. When he passes through the gate, a watch is started to time his flight for a total of 5 minutes. A second watch is started each time he runs his motor, and the total is his accumulated motor-on time. A pilot may turn his motor on as often as he likes during his allowed 5 minutes, and this time is subtracted from his duration time. A pilot can get a perfect score by diving through the gate fast enough to gain sufficient altitude on the other side to contact a thermal without having to turn his motor on. Each second aloft is awarded 1 point; for each second of motor run, 1 point is subtracted; and for each second over 5 minutes in the air, he loses 1 point.

After the thermal duration, the pilot must then land in a 30-meter circle for landing points. The circle is divided into an inner circle worth 30 points and an outer circle worth 15 points. This may sound easy to glider guiders, but at the speeds these models land, it ain't easy!

Rather than give you a blow-by-blow description of the contest, I'll tell you a little about each model, and I'll start with the top four planes.

- 1st place: Jason Perrin, original design: 64-inch span; 330 square inches; 34 ounces; wing loading - 14.8 ounces to the square foot; airfoil - RG12a; motor - Astro FAI 05; prop - K&W 9x6 on short hub; batteries -



Jason Perrin's model kicks up some dust as it slides into the landing circle. Aileron spoilers are evident in this shot.





Jared Stalls: best laps, 12; best thermal duration, 5:02 on 17-sec. and motor run.



Gary Westland: best laps, 10; best thermal duration, 4:56 on 27-sec. motor run.

seven 900 SCRs; motor control - Becker USA on/off switch; connectors - Anderson Power Poles; radio - Airtronics 7SP with ATRCS on aileron, elevator and aileron spoilers.

•2nd place: Bob Sliff, original design: 64-inch span; area - 330 square inches; weight - 34 ounces; wing loading - 14.8 ounces to the square foot; airfoil - RG12a; motor - Astro FAI 05; prop - K&W 9x6 on short hub; batteries - seven 900 SCRs; motor control - Becker USA on/off switch; connectors - Anderson Power Poles; radio - Airtronics Vision on aileron, elevator and aileron spoilers.

A pilot can get a perfect score by diving through the gate fast enough to gain sufficient altitude on the other side to contact a thermal without having to turn his motor on.

•3rd place: Matt Poleking, original design: 58-inch span; area - 350 square inches; weight - 39 ounces; wing loading - 14.4 ounces to the square foot; airfoil - Eppler 205; motor - Astro FAI 05; prop - K&W 8x6; batteries - seven 900 SCRs; motor control - original wiper switch; connectors - Anderson Power Poles; radio - JR Century 7 on aileron, elevator and aileron spoilers.

•4th place: Jared Stalls, original design: 70-inch span; area - 390 square inches; weight - 41 ounces; wing loading - 15.1 ounces to the square foot; airfoil - Quabeck 1.5-10; motor - Astro FAI 05; prop - K&W 8x6; batteries - seven 900 SCRs; motor control - Becker USA on/off switch; connectors - Anderson Power Poles; radio - Airtronics 7SP on aileron, elevator and aileron spoilers.

Ken Myers, UHU kit: 66-inch span; area - 450 square inches; weight - 43 ounces; wing loading - 13.7 ounces to the square foot; airfoil - Eppler 193; motor - Astro FAI 05; prop - K&W 7x6; batteries - seven 900 SCRs; motor control - Becker USA on/off switch; connectors - banana plugs; radio - Kraft Pro Series II on rudder and elevator.

Jim Skinner, original design: 65-inch span; area - 530 square inches; weight - 43 ounces; wing loading - 11.6 ounces to the square foot; airfoil - Eppler 205; motor - geared Astro FAI 05; prop - K&W 12x7; batteries - 7-900 SCRs; motor control - Bal-lasch speed control; connectors - Anderson Power Poles; radio - Futaba PCM 5 on elevator and rudder.

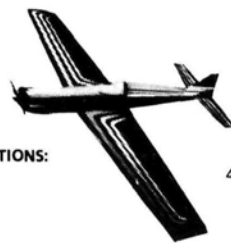
Dieter Lamprecht, Sinus kit: 79-inch span; area - 465 square

(Continued on page 113)

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SPECIFICATIONS:

Engine size	40-50 2 cycle
Radio	4 channel
Weight	4 1/2-5 lbs.
Fuselage	Balsa
Wing	Foam & Balsa
Tail Section	Balsa
Cowl Epoxy Glass	One piece molded
All Balsa & necessary hardware	included

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Building Mode

by JOE WAGNER

Soldering—do's and don'ts for long-lasting wire joints

ALTHOUGH SOLDERING ISN'T frequently used in R/C modeling these days, when it's needed, it must be done *correctly*. Electrical connections must be highly conductive if they're to be effective, yet the fine points of soldering remain unknown to too many modelers.

Solder

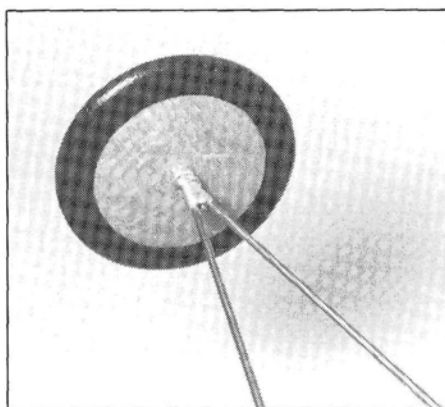
Several different types of solder are available: The most common is called 60-40, because of its composition (60 percent tin and 40 percent lead). It's the stuff used for electronic assembly, since its melting point is lower than that of any other commercially available solder alloy: only 374 degrees. Mechanically, however, it isn't especially strong and acts a little like "Silly Putty" when stressed. A slowly applied load will deform it, and a sharp blow will often snap it.

A stronger tin-lead-type of solder is 30-70 (sometimes called "refrigeration solder"), and this is much more resistant to stress than 60-40, but it's difficult to find these days. Its melting point is far higher than that of 60-40 solder: close to 500 degrees.

The newest solder alloys for modeling are those like "Sta-Brite," which contain a small percentage of silver. Sta-Brite is about five times as strong as 60-40. It's about five times as expensive, too, but it's well worth the extra cost—when properly used! (I'll describe how later.)

In a well-made solder joint, there's a true metallurgical bond between the solder and the metal to which it's applied.

The two materials intermingle at a molecular level, where they meet and produce the strongest possible juncture. This only happens when the metal being soldered is *clean*: free of all oil, grease, paint, or oxidation.



A typical, reinforced, copper-wire juncture of landing-gear wire struts. The smooth, shiny surface shows that the soldered joint is sound.

Solvents like lacquer thinner will readily remove oily surface film from the parts to be soldered. Oxidation, however, should be scoured off with medium sandpaper—used dry, of course. Then, to inhibit further oxidation before the soldering operation is complete, a thin coat of *resin-type* solder flux should be applied to the joint areas immediately after they've been sanded clean.

Soldering fluxes come in two distinct varieties: *resin* and *acid*. The sole purpose of resin flux is to inhibit oxidation, particularly as the underlying metal heats during soldering.

Acid fluxes function differently. There are several kinds, but they all work by *chemically* removing metallic oxides and thus eliminating the need to hand-scour the joints' surfaces. That sounds good, but there are two serious drawbacks to using acid fluxes, and these, to my mind, make them totally unsuitable for model soldering.

- Acid fluxes are corrosive. They're meant to remove surface oxidation, and they do this very well. Unfortunately, they also attack the base metal itself—slowly, it's true; but they'll keep up their action for quite a while unless carefully washed away or neutralized with a baking-soda/water solution. On steel wire, un-neutralized acid flux causes rusting, and even embrittlement. I've seen an 1/8-inch music-wire landing gear so badly affected by acid flux that it snapped as easily as a pretzel stick.
- During soldering, acid flux boils and



Essential soldering equipment: a dual-heat "gun," LA-CO resin flux, a 30W pencil iron (in a Holder-Cleaner), and Sta-Brite high-strength solder.

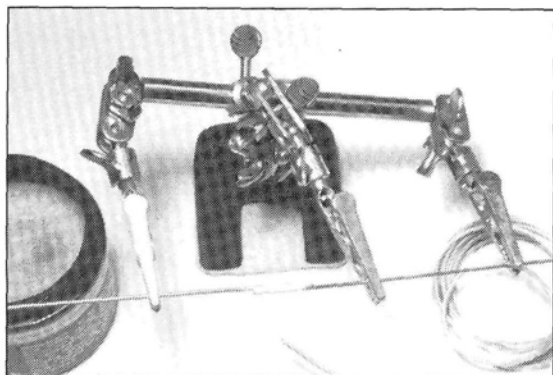
produces a small cloud of acidic vapor. Any steel tools touched by this vapor cloud will quickly rust.

Because of acid flux's faults, I gave up using it long ago. Resin flux is utterly harmless, however, and merely requires a little effort to hand-scour the parts you want to solder. My only problem with resin flux is *finding* it; only one brand seems to be available, and you'll find it at hardware stores. It's called LA-CO Regular Soldering Flux Paste, and a 4-ounce jar costing about \$2 will last most modelers for many years.

Soldering Irons

Two kinds of electric soldering irons are useful for airplane modeling: the "pencil" type and the "gun." For electronic work the "pencil" is the only way to go, because

Airplanes



Sta-Brite soldering can be done without acid! These two lengths of music wire were soldered together using the method explained in the text.

"gun" irons put out too much heat too quickly for a precise control of the solder flow. Molten solder is almost as fluid as gasoline, and it penetrates the smallest crevices if it's hot enough. If you solder a length of flexible lead wire to a switch terminal and the iron is too hot, solder will "wick" up the wire inside its insulation. That turns a flexible multi-strand conductor into a single-strand wire that can break easily if flexed or vibrated.

Some modelers own pencil-type soldering irons in a variety of wattages: 15 watts for electronic work; 25 watts for wiring switches and electric motors; and 40 watts for things like landing gear. I use just one pencil iron—a 30-watter—and I regulate the temperature of its tip according to the requirements of the job.

This is easy and inexpensive to do; all you need are a rotary lamp dimmer, a dual electrical socket, a double workbox (of the sort used in garage wiring) with a suitable box cover, and a length of three-conductor power wire (and a clamp and a plug for it).

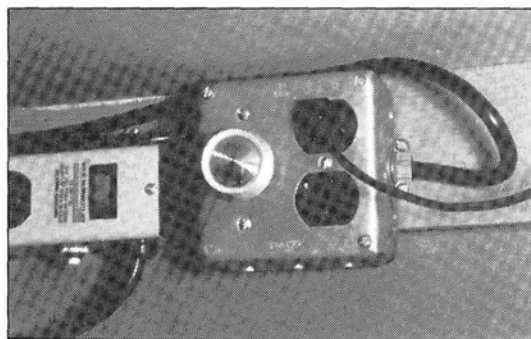
All this comes to about \$7 for materials and takes perhaps an hour to assemble. As well as allowing precise control of the soldering iron's temperature, this homemade "variable voltage control" is also great for regulating the heat of "trim irons" when applying MonoKote, etc., in tight locations.

Soldering-iron tips must be absolutely

clean if they're to work properly; that's why Radio Shack's no. 64-208 Holder-Cleaner is an indispensable accessory for pencil-type irons. It includes a small cellulose sponge, which you soak in water before starting to solder. As you work, you clean the iron's tip by wiping it on the wet sponge as often as necessary.

For soldering things like landing-gear wire, I prefer a gun-type iron because it produces a lot of heat quickly. Even a 40W pencil iron may not be able to keep a couple of pieces of heavy-gauge music wire hot enough for you to solder effectively. The wire conducts heat away from the joint area faster than many pencil irons can replenish it. Solder may appear to be flowing well, but without sufficient heat, it will merely lie upon the surface like a coat of paint, rather than alloying itself tightly to the steel.

While soldering, it's vital to remember that *solder flows toward heat*. The trick is getting the whole joint up to soldering temperature so that solder will flow freely



Installed under the author's workbench, this homemade voltage controller makes it possible to precisely regulate soldering-iron temperature.

throughout the areas to be joined. If you melt solder onto the iron's tip and then try to use that like a paintbrush to spread the liquid metal, it won't work well. It's far better to hold the iron firmly against one side of the joint, while applying solder to the opposite side. The high heat at the iron's tip will then pull the molten solder through the entire juncture and

(Continued on page 118)

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be flush with the ribs; and the ribs should be flush with spar. Install the $\frac{1}{16}$ -inch vertical-grain shear webs exactly as shown on the plan. Install the aileron cable housing, which exits on the lower surface of wing. You can install the antenna in the wing, if you choose.

Put some weights on the wing or pin it to your building board, so that the trailing edge can't lift or twist. Lift up the leading edge to meet the ribs, and glue the ribs to the bottom sheet and the leading edge. Plane and sand the leading edge to match the ribs, then trial-fit the top sheeting.

Apply slow CA to the trailing edge, the ribs, the spars and the leading edge. Starting at the trailing edge, apply the top sheeting. Use a T-bar, or another appropriate tool, to apply pressure to the trailing edge while you glue the sheet to the rest of the wing. Add the tip blocks, sand the leading edge and the tips to shape, and cut the aileron loose. Laminate three layers of $\frac{1}{16}$ -inch ply and carefully cut out a wing joiner.

Build the rudder in the same way. Cut the stab and the elevator from $\frac{3}{16}$ -inch sheet, using C-grain stock, if possible. Taper the elevator to a $\frac{1}{16}$ -inch trailing edge.

Final Assembly

Cover all the separate assemblies. The front fuselage and the wings can be covered with an iron-on film. (I used Mica-Film*.) The duct, the rear fuselage parts, the rudder and the stabilizer must be doped and tissueed: There's simply no way to get an iron-on film into all the little corners! Don't cover the $\frac{1}{4}$ -inch-wide strip along the center of the vertical keel where the horizontal keels will be glued. The canopy should also be doped.

Cut the prop down to a diameter of $\frac{45}{16}$ inches, then drill the motor mount. Assemble the rear fuselage parts with masking tape and rubber bands, and trial-fit the duct. It should be snug, but you shouldn't have to force it. If the duct is too large, sand either the outside of the duct or the inside of the fuselage. If the duct is a little too small, cut $\frac{1}{64}$ -inch ply shims to fit between the duct and the frame. When it's snug, disassemble the fuselage parts. Test-fit the front fuselage and the vertical keel/fin assembly. If the fit is good, carefully align them and tack-glue K2 and the front fuselage together. Check the alignment again—this is critical—then flood the joint inside and out with CA. Attach the motor mount to F6 with socket-head screws, and temporarily assemble the entire fuselage with tape and rubber bands.

(Continued on page 72)

FIFTY YEARS AGO

(Continued from page 24)

Santa Brought a "Dennymite"!

And what was being advertised in the beginning of 1940? Megow's promoted such planes as Dick Korda's winner of the 1939 Wakefield Trophy and a 30-inch flying model that sold for 50 cents! Brown Junior Motors, "for the aviators of tomorrow," offered model engines ranging from \$12.50 to a whopping \$21.50, while the Scientific Model Airplane Company marketed such machines as the "Flying Yankee," the "Miss America" and the "Mercury DeLuxe"—\$6.95! (minus motor, of course!). On the back cover, there was an ad for Sky rider, "the shoes for boys," that promoted a contest in which the grand prize was a "Cloud Comber" gas-powered model. "Its engine develops a $\frac{1}{5}$ horsepower," the ad says. "This real flying model will soar for 10 minutes without landing!" Imagine that! Another ad stated, "We hope Santa Claus brings you a Dennymite"—the latest motor for model aviators in 1940. It must have been a model airplane Christmas in some of the houses across America in those days before the dark clouds of war rolled across our bordering oceans. ■

FANTRAINER

(Continued from page 34)

Wings and Rudder

Make two $\frac{1}{16}$ -inch wing-skin sheets by splicing together two 3x36-inch and one 1 $\frac{1}{2}$ x36-inch pieces. Each spliced sheet should make two wing skins. Note that the upper and lower skins have different outlines at the junction of the fuselage and the trailing edge. Also note that the top skin has a chord that's $\frac{3}{16}$ inch longer than the bottom one.

Glue the spar and the leading edge to the bottom wing skin. Position the ribs, and cut the spar notches. Glue the ribs into place, but apply glue only from the spar to the trailing edge! Do *not* glue ribs to the sheet in front of the spar yet!

Place the top spar on the ribs and mark the spar notch locations. Cut the notches and position the spar. Use a straightedge to check that there are no big dips or bumps; if there are, adjust the depth of the slots. Then glue the top spar into place. Slot ribs 5, 6 and 7, and install the $\frac{1}{4}$ x $\frac{3}{16}$ -inch aileron sub-spar and the aileron root rib ($\frac{1}{16}$ -inch scrap).

Use a T-bar to sand the top of the wing. The trailing edge should taper to a "feather" edge; the aileron sub-spar should

FANTRAINER

(Continued from page 70)

Use a triangle to ensure that there's a 90-degree angle between the fuselage keels. When everything is aligned, glue the horizontal keels into place; glue the duct to the keels; and glue F6A and F6B to the inside of the fuselage. Again using a triangle, glue the stab to the fin. Test-fit the wings to the fuselage; use sandpaper to correct any big gaps. Check the alignment very, very carefully! The wing joiner will automatically set the dihedral.

When you're satisfied, take it all apart and reassemble it (for the final time) using *slow* epoxy to glue the wing joiner to the spars, the fuselage and F5.

Use clothespins to clamp the wing trailing edge to H1. Triple-check the alignment in all directions (stab to wing, equal incidence, square with fuse, etc.). When you're sure it's right, CA the wing skins to the fuselage and H1. This will lock-in the alignment. Glue F5A and F5B to the spars and F5. Let the epoxy cure before moving them.

Using thick CA, make fillets around the wing/fuselage joint and on all rear fuselage joints. Be sure to fill all the gaps on the rear fuselage, because the fan will fling oil *everywhere!* Use a little filler to fill the gap behind the fan where the keels meet, and to smooth the corner of the fuselage top and the fin leading edge.

Put the prop on the motor, insert it into the duct, and attach it to the motor mount with socket-head screws. Try to spin the prop: If you're very lucky, it will spin without any of the blades touching the

won't be sufficient, because the blades on this prop will stretch slightly when it winds up.) Install a 2-ounce fuel tank between F5 and F6.

The tank should be placed with the stopper to the front and the clunk at the rear. Do a good job here, because it could take major surgery to remove this tank when the fuselage top is on. If you're using a throttle cable, install it now.

After the tank has been installed, cut the canopy apart as shown on the plan, and glue the rear section to the fuselage and K1.

Hinge the control surfaces with small, flat, pin-type hinges (Du-Bro* no. 119, or something similar). Don't use paper or one-piece plastic hinges: They're too stiff for the lightweight cables that this model requires. All the control horns are 1/16-inch plywood. Attach them by making a 90-degree bend in the cable and soldering a small washer over the end.

Finish

Whichever finish you use, keep it light (the lightest is sprayed-on dope). My model is finished as RFB's first prototype D-EATR. The second prototype has the registration D-EATP and a similar color scheme. Excellent photos of these planes can be found

in the February '86 issue of *Air International*. The '89 edition of *Jane's All the World's Aircraft* has small black-and-white photos of the first Royal Thai Air Force Fantrainers. Their color scheme seems to be white overall with red trim.

(Continued on page 74)

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duct. More than likely, however, it will be somewhat off-center and the blades will hit the duct on one side. To correct this, install washers or shim stock (or both) under one side of the mount. Try to get a 1/32-inch gap between the fan and the duct. (A 1/16-inch gap is OK, but 1/64 inch

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FANTRAINER

(Continued from page 72)

Starter

Cut the handle off a 3/32-inch ball driver, then solder the driver shaft to a 5-inch length of 1/8-inch brass tubing. Connect this assembly to an 05 electric motor using a 1/8-inch-i.d. coupler (I used Hobby Lobby* part no. GR-3382). Connect a microswitch to the motor with servo tape, and wire it to a 6V source. Make sure it rotates in the right direction!

Motor

My prototype Fantrainer uses an unmodified TD-049 with a standard, vented tank. To use the starter, the prop must be attached with a 3/4-inch-long 5-40 socket-head bolt. Break-in the engine before installing it in the plane, but don't bench-run it with the pusher prop, or it will over-heat.

If you want a throttled engine, use the Ace* throttle sleeve. (See Joe Wagner's article in the May '89 issue of *MAN* for details on setting up this throttle.) One big hint: To get a reasonable idle, the sleeve must *completely* close off the exhaust ports.

Here's the sequence for starting: Open the throttle (it won't start if you don't). Reach through the front of the duct and choke the carb with a fingertip. With your other hand, reach into the rear of the duct and flip the prop until fuel enters the carb (watch the fuel line). Connect the battery, engage the ball driver, and hit the switch. It should start almost immediately. Before starting, always apply a little Lubriplate lubricant to the ball driver to prevent excess wear on the ball head and bolt.

Flying

Turn on the radio, fire up the motor, quickly adjust the needle valve, and give it a good, hard throw. Actually, for the first few flights, it's probably a good idea to have someone else launch it, so that if it's out of trim, you'll already have your hands on the sticks. Let it pick up speed in level flight for a few seconds. You'll be able to hear the motor wind up as the fan unloads. Now point the nose up and watch it climb out faster than any 1/2A model you've ever seen! Unlike the full-size aircraft, the model Fantrainer is capable of the most extreme aerobatics. Lightning-fast snaps, point rolls and knife-edge climb-outs are all within the capabilities of this plane.

Landings are easy if you remember this plane's unusual characteristic: Because of its low-drag design, the Fantrainer will

(Continued on page 76)

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Few modelers have the opportunity to fly at or near their homes. Most have to travel a good distance to satisfy their R/C craving.

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The RCFS is available for the IBM PC (PC compatibles), Apple 2, 2+, 2e, 2gs, Commodore 64/128, and Tandy 1000 computers. Not for the Apple 2c or Macintosh.

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FANTRAINER

(Continued from page 74)

glide very fast unless you pull the nose up to bleed off speed. This is safe because there's quite a lot of washout built into the wings; there's no problem with tip-stalling. Unless you kill the excess speed during your approach, when it hits ground effect, it will just stop sinking and go sailing off into the distance, maintaining a 2-foot altitude for what seems like forever.

If you have a soft, grass field, the Fantrainer is happy to do touch-and-gos—even though it has no wheels! This is the perfect plane with which to amaze those unimaginative folks who think that any model with less than a screaming .60 can only flitter around. Have fun!

*Here are the addresses of the companies mentioned in this article:

Cox Hobbies, 1525 E. Warner Ave., Santa Ana, CA 92705.

Sig Manufacturing, 401 S. Front St., Montezuma, IA 50171.

MicaFilm; distributed by Coverite, 420 Babylon Rd., Horsham, PA 19044.

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

Hobby Lobby International, 5614 Franklin Pike Cr., Brentwood, TN 37027.

Ace R/C Inc., 116 W. 19th St., Box 511C Higginsville, MO 64037. ■

FLOATING AROUND

(Continued from page 39)

down! Bruce is a member of the 130-member Lexington Model Airplane Club. He has passed pictures around, and now other members are interested.

John Nicolaci, of Marion, MA, responded to our request for floatplane information in spades! He sent pictures, specifications and a cover shot from the March '77 issue of *MAN* of a 40-pound, 1/10-scale model of the WW II PBM Mariner. John has been flying this 11-foot giant for 14 years! The Mariner flew on twin Fox 78s until 1982, when John added JATO units. He has flown the plane in five eastern states and Canada. The Mariner's (and John's) latest accomplishment was to place 2nd in a giant-scale competition in Bridgewater, MA. I was 3,500 miles away, but I think he should have placed 1st! Congratulations to John on a great accomplishment.

Finally, I have a letter from float flying's "Old Man of the Sea," Ed Westwood*, of Spanaway, WA. Ed became interested in flying wings after watching some of Bill Evans' designs terrorize the waves at the '89 Clearlake

Meet. On the drive back to Spanaway, Ed drew up plans for a .40-size wing on a pylon float while Paul Weston drove. The result is "The Beast."

Actually, the Beast shown is a .60-size that evolved from the original. Two of the design objectives were ease of construction and outstanding performance, and it appears that Ed got both! He also gets this month's award for unique technique. The Beast's main float is simply a block of foam with 1/8-inch ply laminated to the sides. After the lamination dried, Ed cut the float profile out on a band saw and glued 1/64-inch ply to the top and bottom of the float. Finished! If you study the plane, you see that most of it is held together by flat plates that lap flat sides or ends of other components. It's so straightforward that you wonder why no one thought of this before, and yes, that is a wooden handle sitting where the cockpit should be! You can walk to the shore with your transmitter in one hand and the Beast in the other, toss the thing in, and go!

Ed says that performance of both the .40 and .60 Beasts is excellent. You get all the vertical your eyes can take and, de-

(Continued on page 86)

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FIELD & BENCH REVIEW

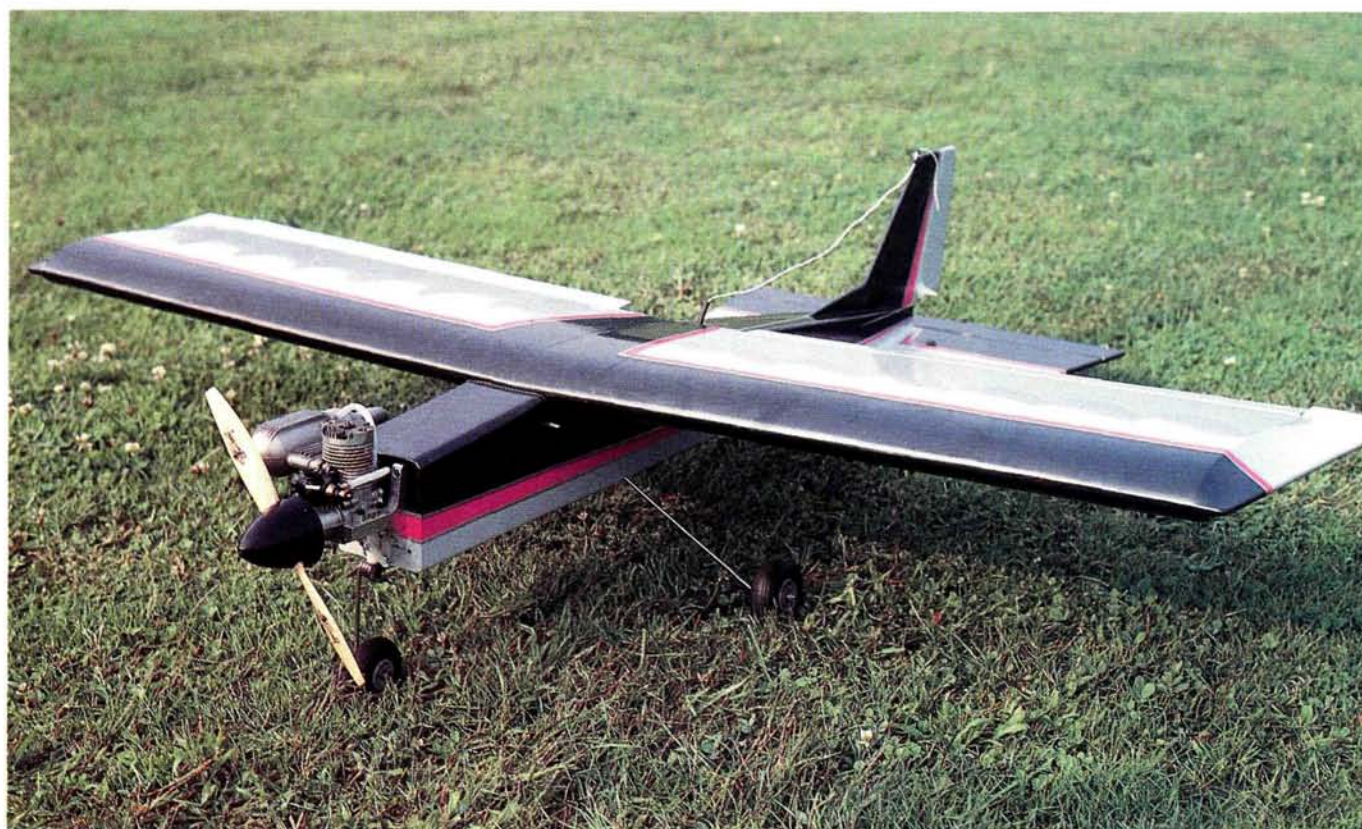
Evolution of the ever-popular "Stik"; "Success Series" format works well.

by JOEL RINDLER



QUESTION: WHEN IS a Stik not a Stik? Answer: When it's an Aero-Sport 40 by Midwest Products*. The kit is one of Midwest's new Success Series, and in redesigning its Sweet Stik, Midwest has made it stronger and has given it a sleek, new appearance.

THE KIT: The instruction book takes you step by step through the construction. Most of the parts are in numbered plastic bags, and this makes them easy to identify. This all-wood kit is mostly balsa and lite-ply with spruce wing spars and maple landing-gear blocks. The



PHOTOS BY JOEL RINDLER

SPECIFICATIONS

Type: Shoulder-wing sport plane

Span: 52¹/₄ inches

Area: 594 square inches

Weight: 5¹/₂ to 6 pounds

Wing Loading: 21 to 23 ounces per square foot

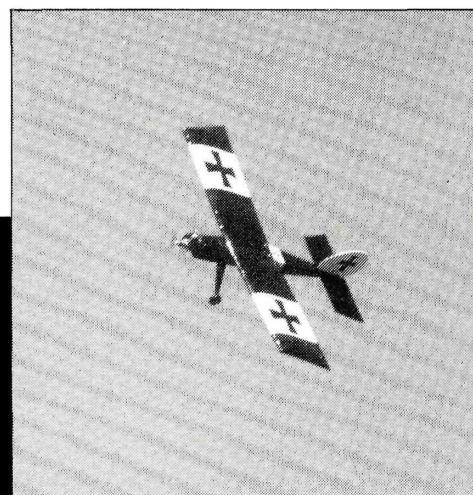
Power Req'd: .30 to .45 2-cycle, .45 to .61 4-cycle

No. of Channels Req'd: 4

Suggested Retail: \$79.95

Features: All-wood construction; strong D-tube wing; top-quality wood and hardware; builder's choice of flat wing or dihedral.

Comments: The parts fit and illustrated instructions are excellent. Construction goes quickly, even though there's a lot of wood in this kit. It would make a great fun-fly ship.



Stik-y business...the evolution

DESIGNED BY PHIL KRAFT and published in *Grid Leaks* magazine in 1966, the Das Ugly Stik model airplane has been kitted by a number of manufacturers. Midwest Products started selling its popular Sweet Stik kits back in 1970, and by the mid '80s, it had expanded the line to include a variety of sizes and configurations.

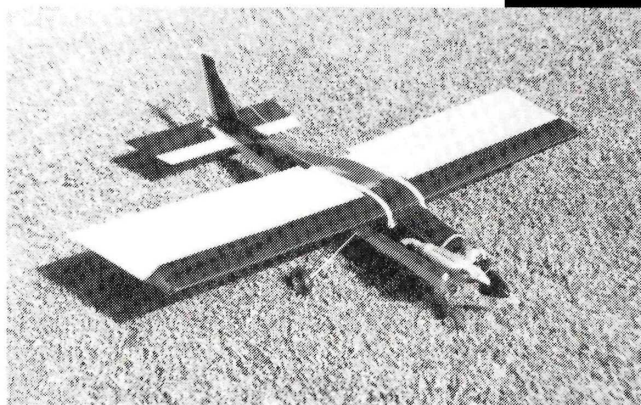
Several years ago, I had the pleasure of building and the agony of crashing (pilot error) the Sweet 'N Low Stik. As the number of stik kits on the market continued to increase, Midwest decided to tool-up for the production of a modified design. Called the Aero-Sport, this new model had a stronger wing structure and a sleeker tail section, and it was added to their new Success Series line.

A common feature of the Success Series kits is a very thorough, step-by-step instruction manual, which is described in more detail in the accompanying article. An interesting addition to the manual is the product evaluation sheet. Modelers are asked to use the sheet to comment on any difficulties that they've had

with the instructions, the plans, the identification of parts, or the building process. Midwest President, Frank Garcher, said that by encouraging such constructive criticism, the quality of the products can constantly be upgraded.

The Success Series began with the Aero-Star, which is a high-wing trainer for 20- and 40-sized mills, and it now includes the 20-, 40-, and 60-size Aero-Sport kits and the Aero-Electric. According to Garcher, public response has been so enthusiastic that Midwest has introduced a new Success Series kit called the Electric Hots (which was the subject of an article in the August '89 issue of *MAN*). An electric-powered glider and, possibly, a low-wing version of the Aero-Star are also planned.

I'd like to see Midwest re-introduce its line of 35-powered profile warbird U/C stunt ships. I built a Mustang and a Skyraider back in the '70s, and I still have fond memories of those planes.



hardware package is fairly complete and includes, aluminum motor mounts, T-nuts, aileron torque rods, control horns, 1/16-inch threaded rods, and other parts that usually have to be bought separately. The hardware is of good quality, and none will wind up in your trash can.

The rolled plans show both wing halves, and the instruction book is an impressive 52 pages long. At the beginning of this book (the heart of all Success Series kits), there's information about the Academy of Model Aeronautics and the address and phone number of Midwest's customer-service department. If you have a question, you won't have to hunt around for this information; it's right up front.

There's a complete list of the materials and tools you'll need for construction, and a short list of additional components that aren't included. There are also three pages of tips on how to read the plans and the instruction book, how to cut parts, and how to use the CAs, which are used almost exclusively. (I used a full 20-gram bottle of both thin and thick CA; it really speeds construction.)

CONSTRUCTION: This starts with the wing. At first, I was disappointed that the ribs had been die-cut. I've always preferred ribs that were band-sawn and sanded, but these ribs looked good: They weren't crushed, two to a sheet; they were easy to push out of the selvage; and they required no touching-up with a sanding block. The ribs were uniformly matched and, because they

weren't quite symmetrical, the top of each was lightly stamped with a "T."

As with each major sub-assembly, the wing instructions told in which bag each part could be found, and they also provided an outline of each part (with dimensions) for easy identification. The wing spars are spruce, and the ribs fit them snugly. No trimming or sanding was required; in fact, all the parts fit well.

My wing halves built up $\frac{3}{16}$ inch longer than those shown on the plans. (Most manufacturers mention that temperature and humidity can distort the plans in this way.) I could have trimmed the parts to correspond exactly with the length shown on the plans, but I chose not to, since all the parts (leading and trailing edges, sheeting and spars) were the same length. So I have a little extra wing! Every little bit helps; right?

Although the D-tube wing structure is very strong, one of the leading-edge sheets split as I tried to wrap it around the ribs from the top spar to the leading edge. I knew that the wood was stiff, and I usually wet it first to prevent it from splitting, but since the instructions didn't call for it, I tried to make it work. Unfortunately, I couldn't, so I had to replace the wood with a sheet from my wood pile.

The wing can be built with or without dihedral. I chose dihedral because it gives a little more stability. The kit comes with two $\frac{1}{4}$ -inch plywood dihedral braces to match your choice. After epoxying the halves together, wrap the center section with the fiberglass cloth provided, using either CA or epoxy. I usually use epoxy for this, because the fumes from that much CA really bother me, but this time, I tried UFO CA from Satellite City*. There were no noticeable fumes or irritation, and it was easier and faster to use than epoxy.

The wing is held to the fuselage with the tried-and-true rubber-band method. If this wasn't a kit review, I'd have modified the construction process by using nylon bolts, but for this review, I stuck exactly to the instructions.

When the fuselage was finished, I "keyed" the wing to it. For this, I glued $\frac{1}{4}$ -inch square balsa strips to the bottom center section of the wing, to ensure that it would always be properly aligned.

Construction of the stabilizer and fin from pre-cut $\frac{1}{4}$ -inch balsa sheet was so simple that my comments are unnecessary. The fuselage is made primarily of

reverses the construction sequence at this point.

When the stabilizer and fin have been glued together at right angles, the assembly is glued to the fuselage just when the fuselage sides are pulled together at the rear and the last fuselage former is installed. To say that I didn't think that I could accomplish all this in one step and have it come out straight is an understatement! To my surprise, and thanks to well-fitting parts and to the clear, well thought-out instructions, it worked (either that, or I'm just better than I thought!).

The material supplied for the stabilizer gussets is pre-shaped balsa cove molding. Midwest sells this molding for dolls houses, and someone who builds both doll houses and model planes suggested that Midwest incorporate it into its plane designs. It's great stuff! For a little extra insurance, I also added some internal gussets.

The radio installation came next, and everything but the radio and the throttle pushrod was supplied.

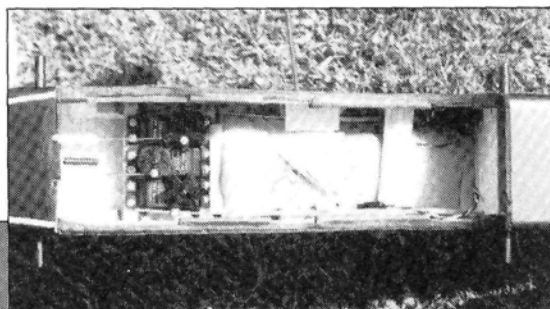
I admit to replacing the $\frac{1}{4}$ -inch square balsa pushrods for the rudder and elevator with $\frac{1}{4}$ -inch

round hardwood dowels. (The balsa pushrods weren't wasted though. I used them to key the wing to the fuselage.) I prefer hardwood dowels for this application, even though the balsa was good, straight-grained, hard stock. Again, the instructions take you step by step through the process.

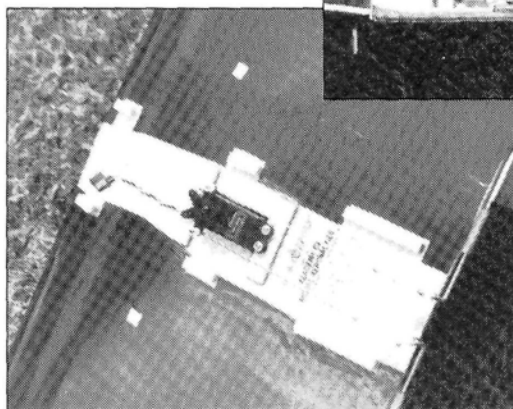
The Aero-Sport 40 has a large radio compartment with more than enough room for my Futaba* FG series radio with standard S48 servos and an SR*, 900mAh battery pack. The recommended control-surface throws are listed on the plans and in the instruction book.

Before I closed the front of the fuselage, I installed a 10-ounce Du-Bro* fuel tank, even though the instructions recommend that you wait until the plane is finished. If you do it my way, installing the tank is easier, but you have to worry about damaging the fuel lines and/or getting dust in the tank while you're finishing the plane.

I used the new Sullivan* Skylite wheels for the main landing-gear installation.



Wing-saddle doublers were trimmed so that landing-gear blocks could be drilled. Next production run of kits will incorporate mods.

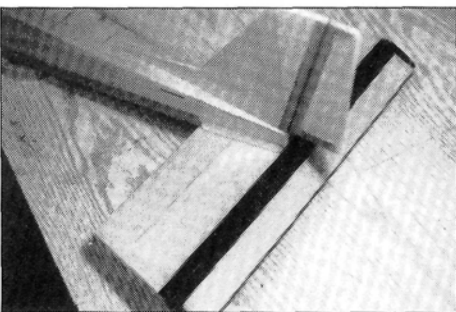


Servo rails were installed using black silicone sealant for extra vibration damping.

3mm lite-ply sides and formers, balsa triangle stock, and top and bottom balsa-and-ply sheeting. Before construction, the $\frac{1}{4}$ -inch plywood fire wall must be drilled

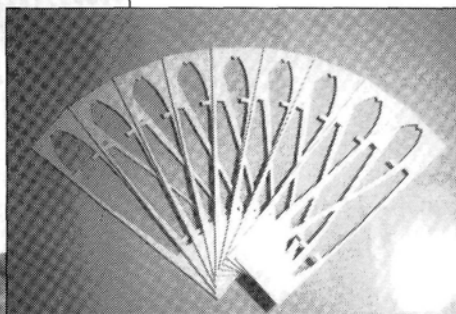
for the throttle and nose-gear pushrods. (The nose-gear bearing block and the aluminum motor mounts are included in the kit.) CA is used to glue the fuselage and the fire wall. The diagonal corners of the formers needed sanding to make the parts fit correctly, and I suggest that you do the fitting and sanding before you glue any parts together.

Next, install the wing-saddle doublers and the landing-gear blocks. Again, I followed the instructions carefully, but this time, I had to trim away some of the doublers so that I could drill the landing-gear blocks accurately. To correct this problem, an addendum to the instructions will be included with future kit runs, and it



The leading edges of moveable surfaces and the trailing edges of fixed surfaces are covered first, then hinges are installed and pinned with toothpicks. Covering will hide the toothpick pins.

Joel, the aviator, test-hopped his Aero-Sport at his club's (Suffolk Wings of N.Y.) field. He appears pleased!



Selva after removal of die-cut wing ribs; the die-cutting in this kit can't be beaten.

completely, do the following:

- Iron a 1-inch strip of MonoKote around the full length of the leading edge of the moveable surface (rudder, aileron, etc.).

- Do the same to the trailing edge of the corresponding fixed surface (fin, wing, etc.).

- Glue the hinges to the moveable surface and pin them with toothpicks.

- Finish covering the moveable surface, covering the pins in the process.

- Glue the hinges to the fixed surface and pin them.

- Finish by covering the fixed surface—the pins are hidden.

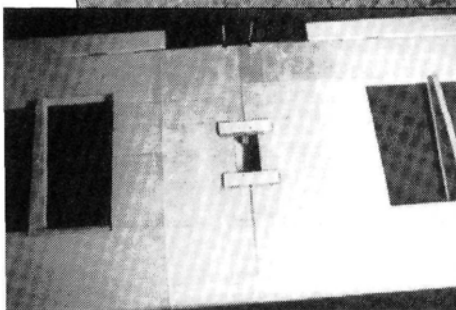
I installed my HB 40 PDP powerhouse on the nose of the Aero-Sport and put a Dynaflyte* exhaust diverter on the muffler to keep the exhaust residue as far from the wing fuselage joint as possible. I found that, even with my battery installed back against the servos in the radio compartment (rather than under the fuel tank as shown on the plans), my finished Aero-Sport balanced at the spar, more than 1 inch in front of the recommended CG. Adding lead to an airplane to obtain proper balance has always bothered me, but I eventually gave in and put 3 ounces of lead into the tail. My Aero-Sport 40 weighed in at 5 pounds, 10 ounces

(within the 5 1/2 to 6-pound range called for) and had a wing loading of 21.8 ounces per square foot.

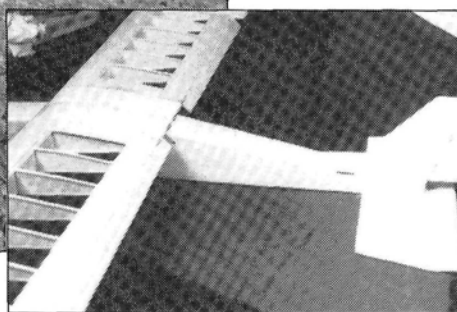
PERFORMANCE: The big day finally came!: the first Sunday in September—a warm, glorious day. I met Bert Dees—friend, flight instructor and all-around good guy—at our propeller-eating field for picture-taking and test-flying.

With a tad of left trim and a touch of up trim, the Aero-Sport was soon grooving straight and level. After trying a few aerobatics, I remembered that we needed flight pictures, so I reluctantly handed

(Continued on page 118)



Fiberglass cloth attached to wing center section with CA and aileron servo rails in place.



Cap strips on ribs and shear webs in place create a very strong D-tube wing.

These lightweight wheels are made of a foam core that's enclosed with a rubber skin. I couldn't make the model sit level using the nose gear provided, so I substituted an adjustable one that I had in my workshop. Ed Rogala, Midwest's Marketing Director, is checking to see if my problem is unique or if a remedy will be required for future kit runs.

I covered my Aero-Sport 40 with Top Flite's* Super MonoKote. I used Metallic Charcoal, Dove Gray, Circus Pink and a 1/8-inch silver trim-striping tape from Great Planes*. Here's a neat trick that I learned from Northeast Aerodynamics*: After epoxying your hinges into place, pin them to the control surfaces using round, wooden toothpicks. To hide the pins

AIRTRONICS

VISION

by JOHN LUPPERGER

*A look into the future—
available now!*

SPECIFICATIONS

Transmitter Type: 8-channel digital-proportional narrow-band
Dimensions: 6x7¹/₁₆x2¹/₄ inches
Weight: 37 ounces
Power Output: 600MW
Frequencies: 50, 53, and 72MHz
Modulation: FM or PCM selectable
Power Supply: 9.6V Ni-Cd
Current Drain: 245mA
Temperature Range: 0 to 160 degrees F
Pulse Width: 1.5ms (Nominal)
Receiver Type: Dual-Conversion PCM Super Narrow Band 92985
Adjacent Ch. Rejection: Better than -65dB at ± 8.5kHz
Image rejection: -62dB
Third-order intercept point: +4 dbm
Sensitivity: 1.5 microvolts
Power Supply: 4.8- to 6V Ni-Cd
Sug. Retail: \$919.95

THE AIRTRONICS* VISION PCM 8SP is destined to change the way we fly gliders and electric models. With its ATRCS Programming System computer, the Vision can make simple work of setting up the most complex multi-channel sailplane, but it can also add an unsurpassed degree of control to a simple 2- or 3-channel model. I'm not saying that the radio does all the work and

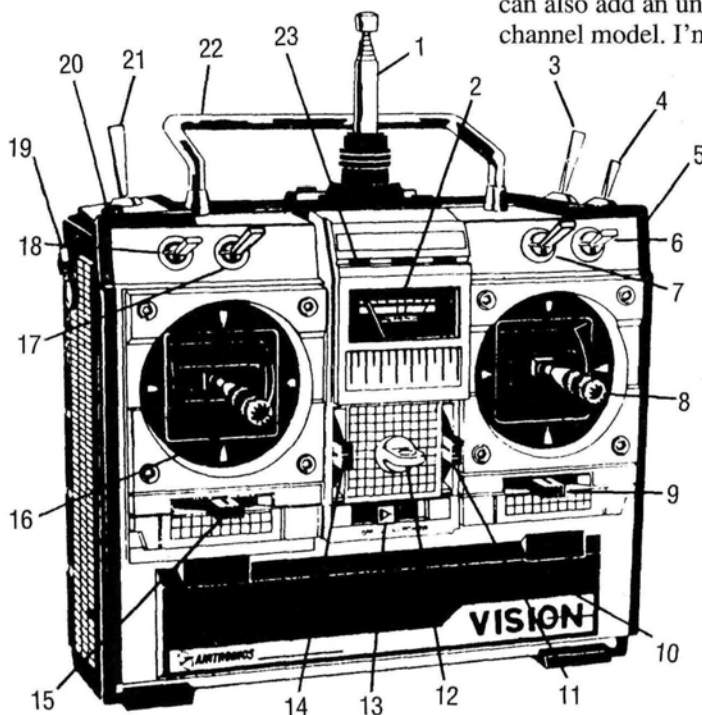
that the pilot is there just to turn it on or off. The Vision does, however, allow the pilot to experience a level of control never before attainable, even with mechanical and electronic mixing combined.

A little over a year ago, I reviewed Airtronics' Module 7SP. At that time, I thought I had the "ultimate" glider radio; then the ATRCS computer retrofit became available. I convinced my wife that it was a worthwhile investment (she's always ready to make a wise investment), and I had it added to my 7SP. I was in heaven, and I decided it couldn't get any better than that; then word of the Vision reached me, and I knew that I was destined to own one.

When I received my Vision, I could hardly wait to use it, but as luck would have it, I didn't have a suitable model ready. I then received a Hobby Lobby International* F3E 7-cell Sinus kit for review, and I decided that it would be perfect for the Vision.

SPECIFICATIONS: I don't have any sophisticated test equipment, so in the specifications chart, you'll see the manufacturer's specs, which I haven't verified. It should be noted, however, that Airtronics has had all of its radios independently tested and they exceed all AMA requirements for 1991 operation.

FEATURES: The Vision has more features than have ever before been available in an over-the-



Transmitter Features and Controls

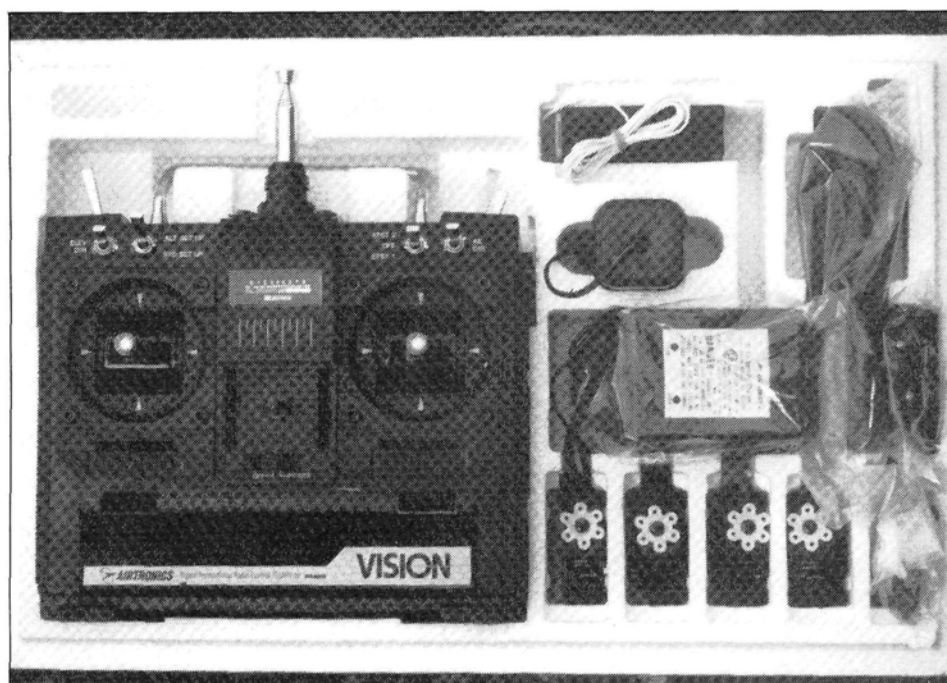
- | | |
|---|--|
| 1. Retractable Antenna | 13. Power Switch |
| 2. R.F. Meter | 14. Trim Lever (Mode I Elevator, Mode II & III Flap) |
| 3. Flight Mode Switch or Aileron/Rudder Coupling Switch | 15. Trim Lever (Mode I & II Rudder, Mode III Aileron) |
| 4. Gear Switch or Elevator/Camber Mixing On/Off Switch | 16. Control Stick (Mode I Rudder/Elevator, Mode II Rudder/Flap, Mode III Aileron/Flap) |
| 5. Auxilliary Control Lever | 17. Alternate Setup Switch |
| 6. Aileron Dual-Rate Switch | 18. Elevator Dual-Rate Switch |
| 7. Elevator Preset Trim Switch | 19. Camber or Spoiler Control Lever |
| 8. Control Stick (Mode I Aileron/Flap, Mode II, Aileron/Elevator, Mode III Rudder/Elevator) | 20. Button (Inactive on VS8SP) |
| 9. Trim Lever (Mode I & II Aileron, Mode III Rudder) | 21. Flight-Mode Switch or Aileron/Rudder Coupling Switch |
| 10. Control Panel Cover | 22. Carrying Handle |
| 11. Trim Lever (Mode I Flap, Mode II & III Elevator) | 23. Power On LED and Dual Rate On Warning LEDs |
| 12. Neck Strap Hook | |

counter radio, but the ATRCS Programming System computer makes it easy for anyone to set it up for a variety of aircraft. I previously had one of the 8-channel high-tech radios that have complicated panels and all kinds of switches and adjustment pots. After several flying seasons, I still had trouble trying to set up a new model with it. The Vision is so easy to understand that basic set-up (without fine-tuning) usually takes only about 20 to 30 minutes.

Vision Series Transmitter features include:

- User-friendly ATRCS programming system
- 16-bit microprocessor for superior computing power
- All-electronic adjustment that eliminates the need for potentiometers
- Easy-to-read liquid-crystal display asks only one programming question at a time to simplify aircraft set-up
- Multiple-model memory stores four aircraft setups
- Non-volatile memory storage eliminates need for backup batteries
- Aircraft templates allow different servo configurations for a variety of models
- Four-level program-access protection
- User-selectable Mode I, Mode II, or Mode III operation
- Electronic servo centering on all channels
- Servo-reversing on all channels
- PCM or PPM operation
- High-capacity, modular, plug-in transmitter battery
- Audio low-voltage alarm for transmitter battery
- Flight-mode switch with camber and elevator presets for speed, thermal and launch configurations

For a radio with so many features, the transmitter is very clean and uncluttered. With the front panel open, you can clearly see the ATRCS Programming System and the six control buttons.



PHOTOS BY JOHN LUPPERGER

What you see when you open the box. The Vision is a complete system with everything you need to get your sailplane into the air.

- Dual-rate on aileron and elevator
- ATV on aileron, elevator, rudder and flaps
- Electronic aileron differential (two levels available)
- Aileron/rudder coupling (two levels available)
- Crow landing option (flaps down and ailerons up)
- Elevator/camber mixing
- Aileron/flap mixing
- V-tail, elevon and flaperon capability
- Elevator compensation for spoilers, flaps and landing gear

This might sound difficult, as you have a lot of things to play with and adjust, but the ATRCS Programming System really does make it easy. With only six push buttons, all of the aforementioned mixing and adjustments can be easily accomplished.

TEST MODEL SET-UP: The Sinus is a four-function F3E competition electric model. Although it has only four functions, its flight characteristics require an additional degree of control. The basic functions are motor control, elevator, ailerons and aileron spoilers. This is an excellent configuration with which to test the Vision's capabilities.

A Novak C-IX electronic speed control was used for motor control.

Two 501 microlite servos were mounted in the wing (the Vision can be purchased with a variety of servos)—one for each aileron. A single 401 mini-servo was used to control the elevator. The airborne was powered by a 250 mAh battery pack.

When setting up your model, first check the Aircraft Configuration Templates, which are shown at the back of the instruction manual. When you've decided which is best for your model, plug the servos into the designated receiver channels. This is very important, as there are nine templates from which to choose.

The speed control was operated from the camber/spoiler lever on the left side of the transmitter.

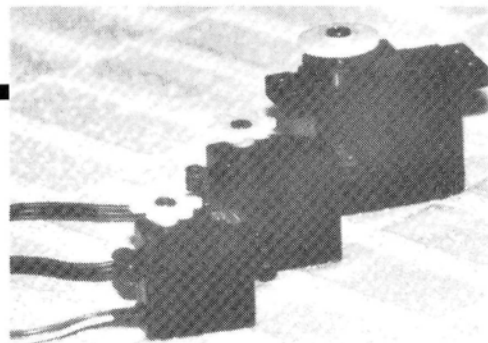
Since each aileron is controlled separately by its own servo, it's possible to dial-in differential travel. This is very important, as the Sinus has no rudder to prevent adverse yaw. First, you must make sure that each servo is moving its aileron in the proper direction. This is done by pushing the left ENT button on the ATRCS panel to move to the Basic Configuration Group Menu and then reversing the necessary channels.

The ENT button is then used to move to the Surface Adjustment Group Menu to set the amount of differential in each servo. First, each servo is set to neutral on the wing by pushing the INC/YES or DEC/NO buttons (this shows on the LCD panel in percentages). Then, by using the same buttons, the travel volume of "up" and "down" is set for each servo in percentage of total travel. To eliminate ad-

verse yaw, I set the Sinus at about 3:1

Next, I set the ailerons for Crow Landing Option. This is usually used in conjunction with flaps to create a slow, steep, landing approach. Since the Sinus doesn't have flaps, the flap adjustments are simply ignored, and the ailerons then work as spoilers. This is accomplished by using the ENT button to move to the Mixer

The three servos shown are: 201 standard, 401 mini, and 501 microlite. The standard servos will work for most applications, but the 401 or 501 are necessary for mounting in most wings



Gains Group Menu and advancing to Crow. The ailerons are then adjusted by percentage until the desired travel (about 60 to 70 degrees of "up") is set for each aileron.

The Landing Threshold is set next. This is the point on the flap stick at which the Crow Landing Option goes into effect. The upper portion of the stick movement usually controls flaps, and the lower portion controls Crow, but since flaps aren't

used on the Sinus, I set the threshold to start as soon as the stick moves to control the ailerons like spoilers. This is done by leaving the stick at its uppermost position, going to the Basic Configuration Group Menu, then down to SET L Thresh (ENT)

and pushing both ENT buttons simultaneously

The final aileron adjustment is that of the Aileron Landing Differential. This is necessary to prevent the ailerons from trying to travel beyond their physical limitations when using Crow or aileron spoilers. Since the ailerons are raised about 70 degrees during landing, normal differential could cause binding. It's therefore necessary to reverse normal differential by making the downward-traveling aileron move further than the aileron on the inside of the turn. This is done by going to the Surface Adjustment Group Menu, then down to Land Diff: 0 percent and pressing the DEC/NO button (while having the Crow option activated) until the upward movement of the aileron no longer causes binding.

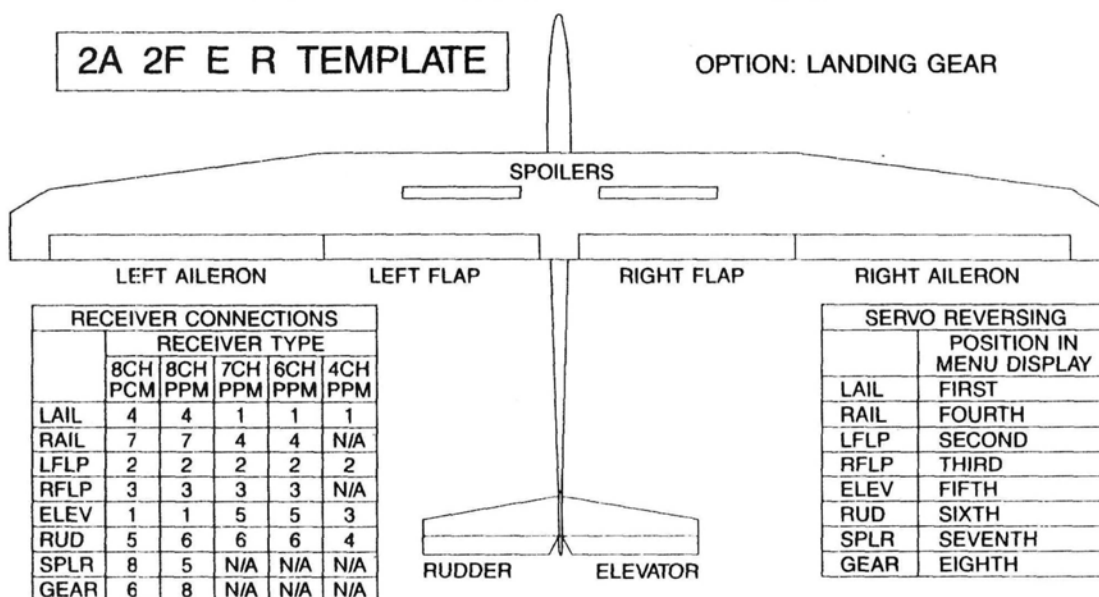
In normal Crow Landing Option use, the model will pitch nose-up. To compensate for this, use automatic elevator compensation. It was found, however, that, when used as spoilers, the ailerons (without flaps) didn't create any pitch change when activated; just a steady increase in the rate of descent, at a decreased air speed.

For best glide or best thermal trim, it's possible to have two additional Ele-

AIRCRAFT CONFIGURATION

2A 2F E R TEMPLATE

OPTION: LANDING GEAR



2A 2F E R MENU STRUCTURE

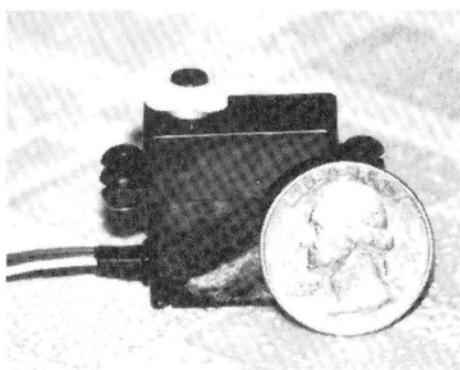
MAIN MENU GROUP	BASIC CONFIGURATION GROUP	SURFACE ADJUSTMENT GROUP	MIXER GAINS GROUP	PRESETS/DUAL RATES GROUP
Load Setup Access Level Save Setup Alternate Setup Alter Mode? Mode B? Calibrate Zero Points EEP Memory Test Stick Function Test Switch Test	Template Selection Gear-Switch Function V Tail Side Lever Reverse Side Lever Function Freeze Flap Landing Disable Camber Landing Hi Ail/ Rudd Mixing Launch Hi Ail/ Rudd Mixing Flight Mode Switch Position Receiver Selection Set Landing Threshold Servo Reversing Servo Pulse Width Selection	Center Left Ail Adj Center Left Flap Adj Center Right Flap Adj Center Right Ail Adj Center Elevator Adj Center Rudder Adj Aileron Differential Adj Landing Differential Adj Left Ail Left Travel Adj Left Ail Right Travel Adj Right Ail Left Travel Adj Right Ail Right Travel Adj Left Flap Travel Adj Right Flap Travel Adj Elevator Up Travel Adj Elevator Down Travel Adj Rudder Left Travel Adj Rudder Right Travel Adj Spoiler or Camber Travel Adj	Ail/Rudd Coupling 1 Ail/Rudd Coupling 2 Ail/Rudd Coupling Reflex Left Aileron/ Left Flap Mix Right Aileron/ Right Flap Mix Crow/Left Aileron Mix Crow/Right Aileron Mix Camber/ Left Aileron Mix Camber/Left Flap Mix Camber/Right Flap Mix Camber/ Right Aileron Mix Down Elevator/ Camber Mix Up Elevator/Camber Mix Camber/ Elev Compensation Spoiler/ Elev Compensation Flap/Elev Compensation Gear/Elev Compensation	Elev Preset Trim 1 Adj Elev Preset Trim 2 Adj Elev Launch Preset Adj Elev Reflex Preset Adj Camber Reflex Preset Adj Camber Launch Preset Adj Flap Launch Preset Adj Aileron Dual Rate Adj Elevator Dual Rate Adj

A typical Aircraft Configuration Template with its necessary hookup and programing information.

vator Preset Trims, which are controlled by the Elevator Preset Trim Switch on the front of the transmitter. When the switch is in the center position, it's off, and this effectively gives you three presets.

To set the presets, you go to the Presets and Dual-Rate Group Menu, then down to ESPT: 1 and 2. Here, use the INC or DEC buttons to set the presets by percentage. Increasing the percentage gives up-elevator trim, decreasing it gives down trim.

The final overall adjustment is that of



To compare sizes, the 501 microlite is shown here with a quarter. I used these servos in the Sinus's very thin wing. Even with a wing loading of over 16 ounces to the square foot, the 501 has performed flawlessly.

setting the dual rates. Using the menu group just mentioned, the aileron and elevator dual rates are electronically set and then activated by the dual-rate switches on the front of the transmitter. I set the dual rates for both at 50 percent of their normal throw. Then, save the entire setup, and you're ready to fly!

As you can see, you can do a lot with just a 4-channel model, but there's still one more available option. You can use the Alternate Setup function, which allows you to switch to an entirely different setup while flying. You could try a different set of control functions, a modification of the same setup, or just an additional set of presets or dual rates.

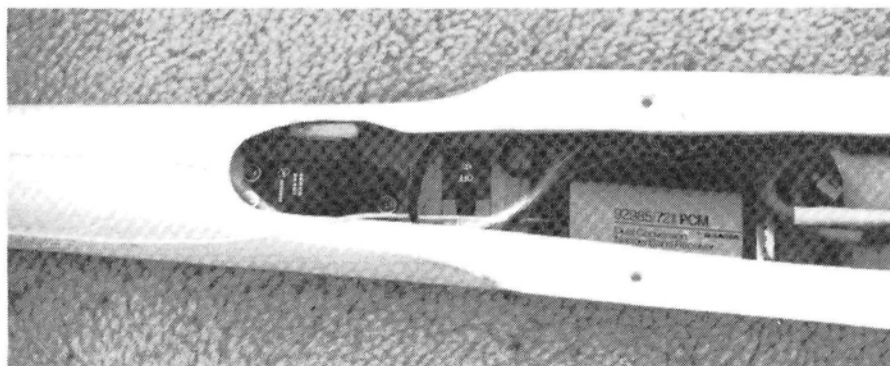
To top it all off, to save time when setting up extra aircraft, you can store four aircraft setups and transfer them from one system to another. If that isn't enough, there are additional settings and adjust-

ments that you can make if your model has controls for rudder, spoilers and flaps. The combinations seem almost endless.

PERFORMANCE: I entered the Sinus in the Harbor Soaring Society's 2nd Bi-annual F3E 7-Cell Contest, which is a very demanding event where models must perform several tasks during each flight.

First, the model climbs under power; then it does laps while gliding. After this timed portion of the flight, the model passes through a low gate to start a timed thermal task with a minimum motor run. Finally, the flight ends with a precision landing inside one of two concentric circles. This is a lot to ask of one model, but the Vision helps to make the job easier.

A typical contest flight goes like this: I switch on and check that all the switches are in the proper positions: dual rates off; elevator preset off; and all trims at neutral. I then launch the model and allow it to climb for about 30 seconds. Then, as I turn onto the course to do laps, I turn off the motor and flip the elevator preset to the no. 1 position for a steeper glide and higher air speed. After clicking off for several laps, I turn off the elevator preset, turn the motor back on for 15 seconds, climb, and then re-enter the course (motor off, elevator preset on), and I try to make four more laps before the allotted 3 minutes are up. Then, to start the thermal duration part of the event, it's elevator



Even though the Sinus fuselage is quite small, there was no problem fitting the Vision. The 401 servo fits just behind the switch and receiver.

preset off and motor back on for a short burst to gain altitude before diving through the gate.

If there's lift, the motor burst on climb-out will last only about 20 to 25 seconds. Then it's motor off again as I start to look for lift. If I find none, or I run into sink, I might go to elevator preset no. 1 to pick up speed and search a larger area for lift.



The receiver is fairly large, but it will fit in all but the smallest models. The standard battery pack is of the square configuration. Airtronics also offers 250mAh and 100mAh packs as accessory items.

When I find it, I flip the elevator preset to no. 2 for a little up-trim while thermalling. During the thermalling phase of the flight, I also switch on the dual rates to smooth my flying and to lessen the possibility of tip-stalling caused by over-controlling.

As my time runs out on the thermal task, I flip off the elevator preset and start my descent. As I make my final turn, I pull back the flap stick, and this activates the spoiler function of the Crow Landing Option. The model's descent steepens as both ailerons go up and, just before touchdown, I ease in a little up-elevator for a picture-perfect landing. Well, that's the way it's *supposed* to go when my flying is up to the potential of the model and the Vision radio, and with this type of high-performance model, it would be difficult to achieve this degree of control with any other radio.

CONCLUSION: With a recommended retail price of \$919.95 (usually available mail-order for \$500 to \$600), the Vision might not be for everyone, but those who want to get the most from their models will find that no other radio offers as much. It gives me better control, and I can fly more closely to my model's potential when it's controlled by the Vision. Whether used with a simple 3-channel electric or a full-house performance

sail-plane, the Vision brings a new degree of control to radio control.

**Here are the names of the companies mentioned in this article:*

Airtronics, Inc., 11 Autry, Irvine, CA 92718.

Hobby Lobby International, 5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027. ■



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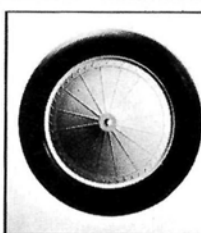
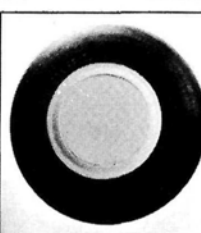
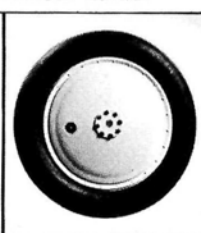

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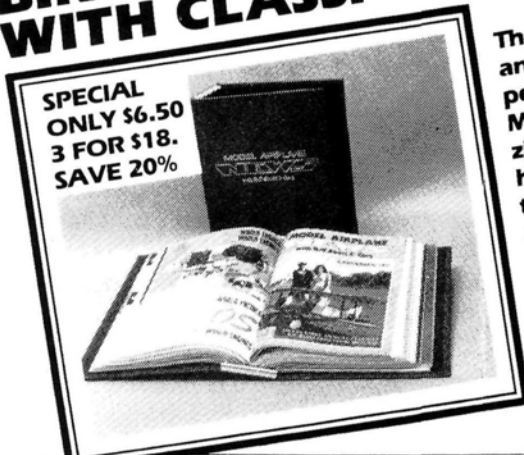
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FLOATING AROUND

(Continued from page 76)

spite that very weird configuration, Ed reports that this is one of the few planes he's flown that's totally pitch-neutral. Put it in any attitude, let go of the sticks, and the Beast acts like it's on a string! I've talked to Ed about the possibility of kitting the Beast so that our readers can take a crack at it. So far, Ed has plans and brief instructions for the .40-size Beast, and he's thinking seriously of a kit.

Havasu is getting so close that I can hardly think of anything else! In addition to all the great planes we'll get to review from that meet, a 96-inch Gee Bee and a 102-inch Pilatus-Turbo-Porter are nearing completion locally. Stay on this wave length!

**Here are the addresses that are pertinent to this article:*

- Unionville Hobbies, P.O. Box 135, Markham, Ontario L3P 3J5, Canada.*
- Omni Models, P.O. Box 1601, Bloomington, IL 61704.*
- Midwest Products, P.O. Box 564, Hobart, IN 46342.*
- West System Epoxy; distributed by Sullivan Float Products, 1421 2nd St., Calistoga, CA 94515.*
- Ed Westwood, 909 S. 173rd, Spanaway, WA 98387.*

OSHKOSH

(Continued from page 47)

senior aviators there almost viewed the Jennys through tears of nostalgia, as they recounted stories of the "clackety-clack" of the OX-5 engine's valve train and recollected the barn-storming era when they had their first airplane ride by fetching fuel à la Waldo Pepper's optimistic "ground crew."

On the other hand, this group seemed to regard the jets as part of a more natural, but not necessarily desirable, progression. (They disdain the term "aerospace.") In contrast, the younger ones looked on the rag-covered airplanes more as oddities than as viable aerial vehicles. Somewhat understandably, they focused on the F-14s, 15s, 16s and A-10s of today's aviators. Never having experienced the very thing about which their elders were so emotional, as they caressed the glistening white skin of a T-38 trainer, I'm sure they could imagine themselves strapped in, climbing through 20,000 in burner and soaring with the proverbial eagles. Maybe the very first step in military pilot training should be an orientation hop in an open-cockpit Stearman or Waco?

As usual, the warbirds drew their share of admiration from the crowd. Even this segment of "civilian" aviation is experi-

OSHKOSH

(Continued from page 86)

encing its own form of evolution. In addition to countless T-6s, three dozen Mustangs and at least one example of many other ex-military hardware, a new generation of warbird is appearing in increasing—and welcome—numbers: the jets! This year, there were no fewer than 22 of these popular kerosene-burners on display, including two F-86s, a T-33, A-4, and F-104, a Hawker Hunter, one D.H. Vampire and Venom, and—not to be outdone—a MiG-15! All privately owned! How about a living, breathing and flying Avro Lancaster? If the sound of a single Mustang gets your blood flowing, then there's no telling what emotions a high-speed pass of the Lanc will evoke. It shares the Merlin powerplant with the '51, so it sounds like four of them in formation! Restored and owned by the Canadian Warplane Heritage, the one on display represented an outstanding accomplishment, performed by a predominantly all-volunteer force.

Throughout the week, there were forums like that presented by Bert Rutan, who described how he builds reduced-scale, man-carrying, proof-of-concept

airplanes; and our very own Budd Davisson humorously confided his secrets for taking successful air-to-air photographs. With over 50 different seminars going on each day, there was a huge menu from which to choose. (We'll have to return for the next 10 years to hear it all!—that's if we don't take time out to watch the daily air show!)

I guess there has to be a down side to everything, so let me tell you what it was this year. For the first time that I can recall, the weekend's weather was horrible: rainy and chilly. The air shows were conducted, but it was difficult to see the crowd-pleasing smoke system on Bob Lyjak's Taperwing Waco against a "scuddy," grey sky. Now that I think about it, it wasn't really all that bad; I attended twice as many of the forums as I had in years past!

As usual, Oshkosh was an aviation extravaganza with something for every enthusiast. It's a modelers' mecca, so make your plans to attend next year on July 27 through August 2. Perhaps the MiGs will show up?!

DURABAT

(Continued from page 56)

movement, and I checked the plane's balance point. The Durabat needed 5½ ounces of lead to counter a tail-heavy condition.

PERFORMANCE: My Hobby Shack* 5JKP Cirrus 5-channel radio was to do the honors and, as always, it performed well. It's an understatement to say that the Durabat is responsive; it responds to the stick *very quickly*, and at high-rate aileron, it will do multiple rolls before you can neutralize the stick. It will do all the aerobatic maneuvers promised by its manufacturer, and you won't have any surprises on takeoff or landing, as the flight controls are responsive throughout the entire speed range.

I didn't modify anything on the Durabat, but I use 3-inch wheels instead of the 2½-inch wheels suggested by the manufacturer, and I suggest that you do the same. With the down-thrust setting of the engine, the prop becomes a grass-cutting machine! If you fly off a grass field, the 3-inch tires will give you a little more "leg stretch"; if you fly off a hard surface, don't bother to change anything.

(Continued on page 106)

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From the publishers of Model Airplane News comes the first, attractively-priced, all-R/C, Airplane Buyer's Guide, with nationwide hobby dealer and newsstand availability. It will be the most comprehensive ever, with hundreds of new airplanes, kits, radios, accessories, coverings, support equipment, tools, and much more. Everything for the R/C airplane enthusiast, plus a special R/C helicopter section. Look for it this spring!

HELICOPTER SECTION

92 Helicopter World Champs
96 Rotary-Wing Roundup

100 1989 Schluter Cup
103 Helicopter Challenge





Cliff Hiatt finishes the Fore-runner flight with a nice flare prior to Round One. Curtis Youngblood calling.

HELICOPTER WORLD CHAMPIONSHIP

THE BEST IN THE WORLD GATHERED TO DETERMINE A WINNER

by DATU RAMEL

IN THE LAST week of August '89, the Navy Auxiliary Landing Field in Fentress, VA, was definitely the place to be! Forty-one contestants from 19 countries gathered to determine individual and team titles in model helicopter flying. Flying a Hirobo SSR with a SideScoops fuselage, 20-year-old Yukihiro Dobashi of Japan dethroned the defending champion, Texan Curtis Youngblood, as the Japanese took team honors for the third time in as many tries. Dobashi's teammates, Kazuyuki Sensui and Shizuo Ishikawa, finished 2nd and 4th.

The Winning Teams' Scores

1. Japan 2,020.5
2. USA 1,843
3. Germany 1,788.5
4. Switzerland 1,771.5
5. United Kingdom 1,733
6. France 1654.5
7. Italy 1626.5

The victorious team's preparation and team approach impressed everyone from the first day of practice to the end of the competition. In a sport that's so dependent on equipment, some may argue whether this contest *really* proves that the Japa-



Above: Robert Gorham videotapes a U.S. teammate. Right: Liechtenstein F3A (pattern) pilots in aqua uniforms stop to watch the rotary-wing guys perform.





Paolo Mella's (Italy) Azzurra Heim Star Ranger.

nese are the best pilots; you can't deny that the finely tuned Japanese machines gave their pilots every opportunity to win.

There's ample evidence of this in the fact that, of the top five teams, only the Japanese scored complete

maneuvers in every flight, in every round (108 maneuvers total for a three-man team) in the contest. As you can see from the Incident Report, the other four major teams (U.S., W. Germany, Switzerland and United Kingdom) experienced

malfunctions that resulted in scores of zero for some maneuvers.

The most significant aspect of the 1989 Helicopter Worlds was the use of compulsory aerobatics in the program of maneuvers. In 1985 (in Ontario) and in 1987 (in Bern), the rules involving difficulty ("K") factors encouraged pilots to select hovering options instead of aerobatic options. The FAI Helicopter Subcommittee changed the rules to the present nine-maneuver combination of hovering and aerobatics in order to generate more spectator interest and to make the helicopters fly in a larger performance envelope. Both goals have been achieved.

On many occasions, the crowd applauded or cheered for well-executed aerobatics, and we witnessed the widespread use of computer radios that have two-rotor-head speed and throttle/collective setups available to the pilot: one for the low-and-slow hovering segment, and one for the fast-aerobatics seg-

(Continued on page 95)



X-Cell Long Ranger and caller Wes Suggs circle U.S. pilot Tom Dooley.

PHOTOS BY DATU RAMEL

HELICOPTER WORLD CHAMPIONSHIP

FINAL STANDINGS FAI/F3C HELI CHAMPIONSHIPS

Place	Name	Country
1	Yukihiro Dobashi	Japan
2	Kazuyuki Sensui	Japan
3	Curtis Youngblood	'87-'88 Champ
4	Shizuo Ishikawa	Japan
5	Robert Gorham	USA
6	Ewald Heim	West Germany
7	Leonard Mount	UK
8	Daniele Graber	Switzerland
9	Timothy Schoonard	USA
10	Josef Brennsteiner	Austria
11	Volker Heine	West Germany
12	Thomas Dooley	USA
13	Maurice Depigny	France
14	Peter Daepfen	Switzerland
15	Colin Bliss	UK
16	Rudolf Linder	Switzerland
17	Jochen Gerkens	West Germany
18	Massimo Rocchi	Italy
19	Michael Lieu	Hong Kong
20	John Wallington	UK
21	Massimo Aita	Italy
22	Paolo Mella	Italy
23	Gerald Weil	France
24	Philippe Rose	France
25	Rob Barbuto	Australia
26	Harald Bingel	Austria
27	Joop van Lent	Netherlands
28	Jan Verhagen	Netherlands
29	John Wessel	Australia
30	Geoff Woodward	Australia
31	Kees Verplanke	Netherlands
32	Efraim Kastiel	Israel
33	Kari Porokka	Finland
34	Christer Palmdahl	Sweden
35	Han Jun Park	Korea
36	Kit Flammang	Luxembourg
37	Alan Campbell	New Zealand
38	Angel Maldonado	Argentina
39	Patrick Prange	Luxembourg
40	Jyrki Lehtinen	Finland
41	Neville Wright	S. Africa



Jyrki Lehtinen's (Finland) X-Cell sports Day-Glo stripes that match his shirt.

(Continued from page 93)

ment.

Noteworthy absences from the Fentress entry list:

- Taya (Japan)—'85 World Champion and 8th in '87
- Hiatt (USA)—'84 and '88 American Champion and 7th at the '85 Worlds
- Lucchi (Italy)—4th at '87 Worlds and 16th at '85 Worlds
- Mueller (Switzerland)—6th at Canada Worlds and 15th at Bern
- Iyobe (Japan)—2nd at Bern in '87
- Ikeda (Japan)—7th at Bern in '87
- Davideit (W. Germany)—17th in '87, 18th in '85
- Mas (USA)—past American champion and 9th at Bern Worlds in '87

The FAI/F3C program of nine maneuvers:

Hovering Segment—Hovering M, Horizontal-8 Nose-In Circle, Top Hat (with two slow pirouettes of opposite rotation).
Aerobic Segment—540 Stall Turn, Loop, Roll, Rolling Stall Turn (half-roll during ascent) and 180-Degree Autorotation.

The top 12 flight scores: Five judges grade the nine FAI helicopter maneuvers on a 10-point scale, and the high and low scores are discarded. A perfect maneuver would get 30 points (3x10) from the three judges, and a perfect flight is worth 270 points.

1) 238.0, Dobashi (Japan), Round 3. 8.81 points per maneuver. Superb 540 Stall Turn and Roll. One judge awarded him a 9.5 for the Rolling Stall Turn.

2) 235.5, Sensui (Japan), Round 4. In the Rolling Stall Turn, the entry wasn't quite straight up, but once the half-roll was completed, he showed us the best vertical penetration of the contest.

3) 231.0, Dobashi, Round 4. Exited the Loop slightly lower than he entered, but a very

(Continued on page 126)



Yukihiro Dobashi (Japan) and his Side-Scoops Hirobo SSR during hovering maneuvers.

ROTARY-WING ROUNDUP



ROBBE Magic Ranger

The Magic Ranger is a high-performance, aerobatic heli that uses a .60-size engine. It combines

the compact mechanics of the Magic with a Bell Jet Ranger fuselage. This lightweight epoxy fuselage is molded with a white gel-coat finish, and it

comes complete with an epoxy fuselage top and vertical stabilizer, all windows, fuselage reinforcements and additional parts required to install the mechanics. A white landing-gear set, a remote glow-plug extension, a decal sheet and detailed building instructions with an exploded-view plan are supplied as well. The fuselage kit is available separately to convert the existing Magic into the Magic Ranger.

For more information, contact Robbe Model Sport, Inc., 180 Township Line Rd., Belle Mead, NJ 08502.

R-6HOBBY DYNAMICS PCM 9 Helicopter System

The JR PCM 9 Helicopter System includes ABC&W dual-conversion receiver; four JR 4001 servos; rechargeable transmitter and airborne Ni-Cds; Ni-Cd charger; complete servo accessories and hardware. This system features servo-reversing, dual rates, adjustable exponential, interference/battery

failsafe, ATV, ATS, high idle (2), direct servo controller, trainer system, throttle hold (2), hovering throttle, collective pitch (4), hovering pitch trim, cyclic collective-pitch mixing and inverted flight system.

Price: \$884.99.

For more information, contact Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.



GORHAM MODEL PRODUCTS The Rebel

The Rebel is a new, entry-level helicopter that's similar in design to the Cricket, but this larger model is .40-powered and will resist gusts better. The Rebel includes: a one-piece, plastic rotor head; black-anodized, all-metal parts; and a step-by-step instruction manual. It can use a standard airplane engine and starter, and, ready to fly, it weighs approximately 6.5 pounds. An inexpensive videotape that shows set-up and flying is also available.

Price: \$240.

For more information, contact Gorham Model Products, Inc., 23961 Craftsman Rd., Calabasas, CA 91302.



MORLEY HELICOPTERS Bell UH-1 Huey

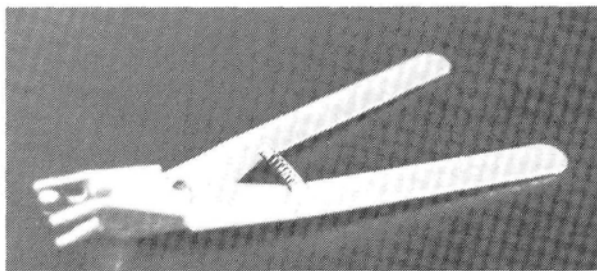
The Bell Huey is the most widely produced aircraft in the world. This 1/10 near-scale model from Morley Helicopters captures the character that has made the full-size aircraft so famous. The model has a 48-inch-diameter rotor with cyclic- and collective-pitch control; it weighs 8 1/2 pounds; and it requires a 40-cubic-inch engine, a 4- or 5-channel radio and five servos. The comprehensive kit includes: a quality, 45-inch-long G.R.P. body shell; ball-raced main and tail gearboxes with steel gears;



and an aluminum chassis with all links and fasteners. It's suited to both novice builders and scale connoisseurs.

Price: \$497.95.

For more information, contact Morley Helicopters R/C Models, P.O. Box 6026, San Pedro, CA 90734.



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For more information, contact Miniature Aircraft USA, 2324 North Orange Blossom Trail, Orlando, FL 32804.

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The Super Mini electric has been designed for indoor and outdoor use.

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ance, an optional Super Mini gyro sensor is also available.

For more information, contact R.C. Hobbies, Inc., 2145 Geary Blvd., Suite 275, San Francisco, CA 94118.



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Yellow Aircraft CAP-10
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Miniature X-Cell 30
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Top Flite Elder Bipe
Hobby Lobby/Graupner Race Rat
Midwest Hots II
Sig Four-Star 40
O.S. Ryan
Global EZ F-16
Kyosho Electric Mustang
Dynaflite 40 Mustang
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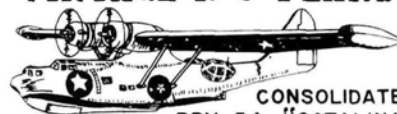
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Standing (left to right): Frank Heinrich, Vice President, Robbe; Linda Tilden and Vince Canzanese, Manager, Schluter Division. Kneeling (left to right): Al Smith (3rd place, Scale); Doug Law (3rd place, FAD); David Ramsey (1st place, Scale); Mike Mas (1st place, FAD); Chuck Wildey (1st place, Novice); and Dale Hart (1st place, Intermediate).

Below: The youngest competitor, Ron Renk, flew his Schluter Scout to 9th place in the Novice category.



PHOTOS BY CARL HEINECK



SCHLUTER CUP

A great turnout for an event that's sure to gain in popularity.

by DAVE RAMSEY

READING ABOUT A HELICOPTER contest is nothing like being there, and that's what makes writing about one such a challenge. I was there for one of my favorites: the second, annual Robbe/Schluter Cup that was held last September.

The Schluter Cup is open to anyone who is interested in R/C helicopters, and it provides a great opportunity for beginners to ask questions and to listen to the triumphs and failures of other contestants. (Some of their helicopters never do get off the ground.)

At this year's contest, I checked out a Schluter Junior 50 for a (I hate this word) beginner. It was his first helicopter, and he'd

SCHLUTER CUP WINNERS

	Contestant	Helicopter	Engine	Radio
FAI				
1st	Mike Mas	Schluter Champion	Enya	JR
2nd	Wayne Mann	MAS X-Cell	Enya	JR
3rd	Doug Law	MAS X-Cell	OPS	JR
4th	Wendell Adkins	Schluter Scout	O.S.	Futaba
INTERMEDIATE				
1st	Dale Hart	Schluter Champion	Enya	Futaba
2nd	Len Sabato Jr.	Schluter Champion	Enya	Futaba
3rd	Herb Goldberg	MAS X-Cell	Webra	Futaba
4th	Bob Brassel	Schluter Champion	O.S.	Futaba
NOVICE				
1st	Chuck Wildey	Schluter Magic	Rossi	Futaba
2nd	Samuel Culver	MAS X-Cell	O.S.	JR
3rd	John Sproul	MAS X-Cell	O.S.	JR
4th	John Pierce	Schluter Champion	O.S.	Futaba
SCALE				
1st	David Ramsey	Schluter 222 UT & Junior 50	Webra	Futaba
2nd	Dale Hart	Schluter Long Ranger & Champion	Enya	Futaba
3rd	Al Smith	Heim 222 Airwolf & GMP Cobra	O.S.	Airtronics
4th	George Roeck	Schluter Jet Ranger & Helistar	O.S.	Futaba



Dave Ramsey, 1st-place winner in Scale category, and his Schluter 222 UT with Junior 50 mechanics, in the University of Tennessee's EMS Lifestar livery.



First-place winner in the FAI category, Mike Mas (with Linda Tilden, calling), flying Schluter Champion.



Al Smith with Heim/GMP Cobra Airwolf.

done a pretty good job, but there were areas that needed more work. We listed what he had to do, and I agreed to take another look when he'd finished.

If you're into helicopters and need help, don't overlook the resources that are available at contests and fun-

flies. Have your machine checked out and trimmed for hover before you use those transmitter sticks. Keep in mind that manufacturers' reps attend these contests and fun-flies and that they can provide you with some valuable information. There are also many experienced pilots who are happy to offer advice. *Warning:* Stay away from the guy who is on the flight line or about to get on; his mind is on one thing—*flying!* To see some great flying and to take advantage of all the available information, you really owe it to yourself to attend these events.

Despite the miserable weather, Robbe Model Sport, the West Windsor Flying Club (our hosts), and the Mercer County Park Commission went all out to provide some great competition.

Robbe awarded plaques to 1st, 2nd, 3rd, and 4th-place winners for Novice Intermediate, FAI and Scale, and they raffled off prizes that included a Schluter Magic, Futaba PCM7, GMP gyro and Webra 61. Other manufacturers also awarded some great prizes.

What about the 1990 Robbe/Schluter Cup? Whether you participate or not, it will be a contest worth attending. ■

Helicopter Challenge

by CRAIG HATH

PHOTOS BY CRAIG HATH

Making the crash a positive learning experience

A CRASH CAN BE a positive experience. It's an inevitable event for anyone who flies a model helicopter, and it's important to be prepared for it. You must maintain a positive attitude, and you should have certain parts on hand to replace those that are most likely to be damaged in a crash—a formidable undertaking, but one that can save you time and money.

The main- and tail-rotor blades, body and canopy, and servo trays (if



Troy Daigneau, flying his Kyosho Concept .30. This is quickly gaining popularity as a beginner/sport machine. Troy says it's the perfect size to toss into his motor home while he's on the road with "mama."

This is even more important if you aren't near a hobby shop that carries the right parts.

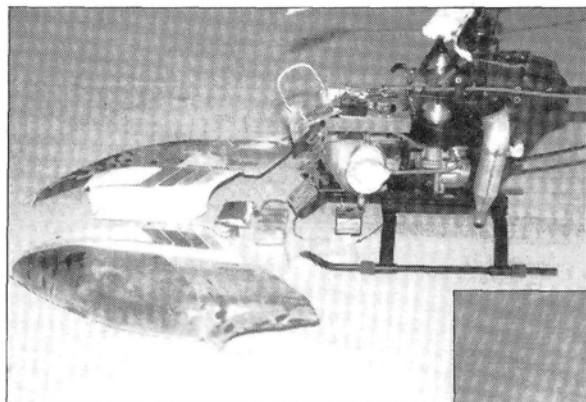
Other parts to have on hand include, replacement main shaft, flybar,

landing-gear struts and skids, tail boom and drive shaft, tail fins, main-drive gear, and some spare universal ball links and rods. Buy an assortment of the nuts and bolts that are used on your helicopter.

The parts mentioned here are for damage caused by a very hard landing or a tip-over in hover, and they'll enable you to repair your machine and have it back in the air in just a few hours. Although other parts will probably be damaged, it isn't practical to have an entire spare helicopter kit just for parts.

Some pilots become so frustrated when their helicopter crashes that they want to give up. I tell beginners to expect an occasional mishap. If you're fortunate enough to have a good pilot guiding you through the early stages, you'll probably have fewer crashes. If an experienced pilot helps you to set up your equipment properly, your helicopter will be easier to fly and more dependable. Engines that are adjusted correctly don't overheat from lean runs or die at idle because they're too rich. You can't put a price tag on the value of those who share their experience.

There is a positive side to crashing: If you analyze the situation, and evaluate the cause, you'll be closer to preventing it from happening again. Perhaps you've experienced mechanical failure, or you've had a



Left: This is the author's X-Cell after it had crashed. Actual damage wasn't as bad as it looked. Servo tray pushed cooling shroud into fan, which promptly exploded.

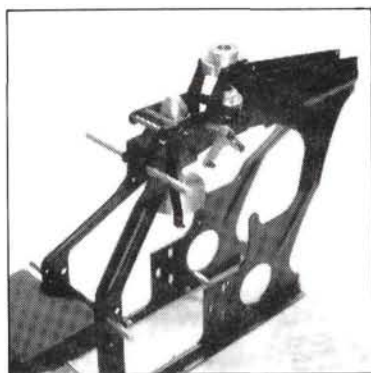


Another look at the crash. This bird went straight in, wide open. Cause of crash was definitely pilot error (see text for details).

your machine uses a wooden tray that needs to be assembled and painted) are some of the replacement parts that you can prepare ahead of time, while your machine is in good flying order. Prepare two or three sets of rotor blades, especially if you use wooden blades that require the additional weight, covering and balancing. Once you have all the supplies and equipment handy, extra sets of blades don't require that much more effort.

Preparing the body in advance also allows you to be more creative with your next paint scheme or finish. Too often, I've heard fliers apologize for the appearance of their machine, because they haven't had the time to "do it right." Why not sidestep this issue altogether by being ready in advance?

HELICOPTER CHALLENGE



A new project on Craig's workbench: the Kalt Excalibur. More details on this in future columns.

case of "dumb-thumbs." Whatever the cause, you'll now have intimate knowledge of its effect.

Sometimes, you won't be able to determine the exact cause of a crash, but you can usually narrow it down. This happened to me recently when I had just finished trimming for hover, and I was trying to determine engine-needle setting. To check the high-speed fuel mixture, I had intended to make a full-throttle takeoff into forward flight and to return to the ground for any needed adjustments. As I opened the throttle and turned the helicopter downwind climbing out, it nosed over and headed straight for the ground from an altitude of about 20 feet. I throttled back and pulled back on cyclic pitch with no noticeable effect, and the helicopter hit the ground from a straight-in attitude. The engine continued to run wide open, and it wouldn't respond to input from the transmitter.

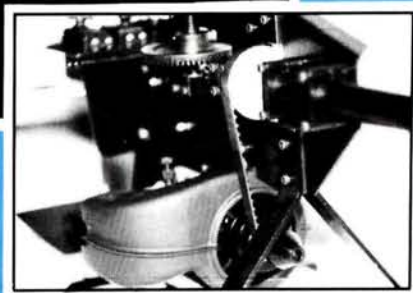
When I arrived at the scene, I stopped the engine and reached for the receiver power switch. The switch had moved toward the off position, but it wasn't fully into the off-position detent. This could have been the result of the inertia at impact or of some object striking the switch during the crash. It's also possible that I hadn't completely moved the switch into the on-position detent before flying and that vibration had caused the switch to shut off.

I collected the ship and the parts and carried them back to the pit area. While I was checking out the radio gear for a component failure, I noticed that the inverted-flight switch on the transmitter had been moved into the invert position! Since I had carried the transmitter with me to the crash scene and had then

MEET THE CHALLENGE !



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toted it and the helicopter all the way back to the pits, it's possible that the invert switch was bumped or that I hit it as I lifted the helicopter into forward flight. I'll never know for sure.

At least, I have a good idea of what happened, and in both cases, it was probably pilot error. The funny thing about this crash (and most of my other crashes) is that there seemed to be a warning. If the receiver switch was the culprit, the warning may have come in the very brief "glitch" that I noticed while hovering during the few seconds just before the

crash. If I had taken heed and landed the helicopter for an inspection, I might have found the problem.

It did occur to me that it would be easy to inadvertently hit the invert switch. Perhaps I should have inhibited this switch, since I rarely use the inverted flight system anyway. Also, I wasn't familiar with every switch location on this new transmitter.

The moral of this story? Learn from your mistakes, and have an attitude that allows you to progress in the face of disaster. As the famous quotation goes:

(Continued on page 131)

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DURABAT

(Continued from page 88)

Jeff Prince, who handles the controls at Duracraft, Inc., suggests that you take a few nights to construct the Durabat, then go out and have a good time. I did just that and had a ball. My good friend and flying partner, Dave Rigotti, is now constructing his own, and when his is complete, right off the bat, we'll engage in some combat with streamers attached to the Bats' tails. We'll bat around the sky and won't bat an eyelid when we crash and the wings stay intact. I'd go to bat any time for the Durabat!

*Here are the addresses of the manufacturers mentioned in this article:

Duracraft, 1007 Orchard Grove Dr., Royal Oak, MI 48067.

Coverite, 420 Babylon Rd., Horsham, PA 19044.

Robert Manufacturing, 310 N. 5th St., P.O. Box 1247, St. Charles, IL 60174.

Pactra (Plasti-Kote), 1000 Lake Rd., Medina, OH 44256.

O.S./Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728

SUPER TIGRE X61

(Continued from page 61)

Final carburetor settings were: main needle, 2 1/2 turns, open; idle/secondary needle, 1 turn open.

Horsepower Claims

Some Italian manufacturers are attempting to rationalize the contentious matter of hp claims. Super Tigre's recent laid-back approach makes just the one claim of 1.85 hp at 16,500rpm for each of its four, varied, ABC .60-cubic-inch motors (including this test X61K), but with no comment on the vital associated equipment of tuned pipe and fuel content, the addition of which can push figures up to around 2.4hp. Exactly where the test motor's figures fit into this is difficult to see.

Even more laid-back is the new OPS position that makes no hp claims whatever for any of its engines, while still giving the important detail of pipe style, fuel blend and rpm point at which the hp (if any) would occur.

Somewhere between these two diverse approaches lies evidence of dissatisfaction with the "paper hp chase" and further repercussions among other manufacturers seem likely to follow.

Super Tigre's sound engineering continues to provide strong, reliable machin-

(Continued on page 113)

BVM F-86F SABRE

by FRANK TIANO



Frank and Bob Violett pose with their Sabres—both built from Bob's kit. Nice to have the manufacturer perform the trim flights!!



A trio of F-86s with our review subject leading the way. The Sabre is one of the classiest-looking jets around.



Final checkout of the inner workings before putting the hatch into place. Owing to the absence of cheater holes, starting is accomplished by inserting a probe into the unobstructed inlet.

PHOTOS BY FRANK TIANO

All you need is a reduced-scale Yalu River and a couple of MiGs

THE F-86 SABRE Jet is as American as apple pie and Chevrolet. It's as well-known to the blow-torch crowd as the P-51 Mustang is to the prop jockeys. Along with the Mustang, it just well may be one of the most famous aircraft of all time. I can't think of any airplane buff who doesn't care for the pleasing lines of the Sabre. (Well, maybe I should take that back. There was this group of guys we tangled with over the

Yalu River some time ago, and from the looks of the stuff they were driving, their tastes for sleek design must have been left in the chow hall!!)

Bob Violett* lives in Winter Springs, FL, where he operates family business with his wife Patti and his daughters Marcia, Patti and Debbie. Bob is an ex-fighter pilot, an ex-airline pilot and a perfectionist like you've probably never seen. Bob has

flown several dozen combat missions in Vietnam and hundreds of thousands of miles across the U.S.

He doesn't fly for the airlines anymore, and you won't find him catapulting off a heaving carrier deck, either; in fact, he hasn't placed his feet on the rudder pedals of an A-4, an F-8, or a 727 for a few years now. All his energy has been concentrated in developing what he touts as the best-performing, ducted-fan kits on the market today. Let's see.

After many years of developing a ducted-fan propulsion system and an appropriate airframe, Violett has produced a nearly exact scale model of the famous F-86F Sabre Jet. What makes this F-86 stand apart from many others would require a whole additional article, so let's just say that this is one outstanding kit!

So many kit reviews we read today are simply shortened versions of the kits' instructions; this review will *not* be one of those! Some reviews tell you how to bolt this to that, or how to install the AGD to guard against vibration. This one won't. And most kit reviews never really review the entire envelope, if you will. This one *will*. When we watch Rex Reed or Siskel and Ebert do a movie review, they don't start by telling us to buy a couple of tickets, grab some popcorn, get a nice seat, check out the decor and don't smoke. No, sir! They *review* the movie! They tell us what's good, or not so good. I'll do the same thing—but there isn't too much that isn't good about this kit!

THE KIT: First, let's analyze exactly what we're looking at. We have a world-



No visibility problems here! Frank reports that the Sabre flies very smoothly; it's one the average flier could handle.

SPECIFICATIONS

Type: Scale, ducted fan

Span: 58 inches

Length: 58 inches

Area: 740 square inches

Weight: 12 pounds (average)

Wing Loading: 35-38 ounces/square foot

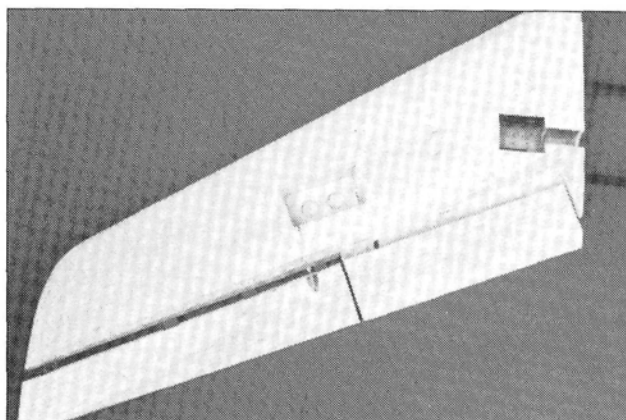
Power Req'd: KBV .82 with Violett Ducted-Fan Unit

Channels Req'd: 5 minimum

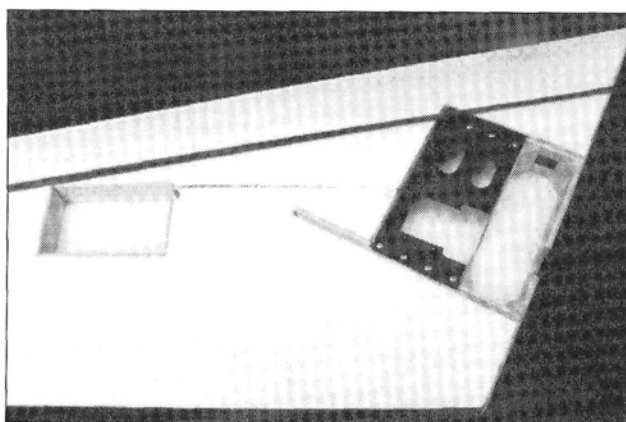
Sug. Retail: \$450, plus options and power system

Features: Epoxyglass, Kevlar reinforced fuselage and machine-cut foam cores for wings and vertical fin. Pre-joined balsa wing sheeting. Molded carbon-fiber accessories, plus complete plans and assembly instructions.

Comments: A top-quality kit in nearly all areas. High level of prefabrication and an excellent construction manual bring assembly and operation within the capabilities of the first-time jet modeler. Properly built and finished, it offers outstanding performance with no discernible "bad" flying qualities.



Lower surface of right wing panel after attaching balsa sheeting. Rectangular cutout in center houses aileron and flap servos.



Right wing panel prior to sheeting. Dark stripe running span-wise is carbon-fiber reinforcement, supplied in kit along with injection-molded retract mount plates.

class competition scale kit. It's 58 inches long, has a span of 58 inches, and it weighs in at 11 pounds or so. The scale factor is 1/7.6, and the kit retails for \$450. When you consider what this kit offers, it's probably a little underpriced! For instance, the epoxyglass fuselage, with Kevlar reinforcement, is among the finest available *anywhere*. To provide more strength, every servo-mount location has been reinforced at the factory. The bag of injection-molded parts alone is probably worth a lot of green.

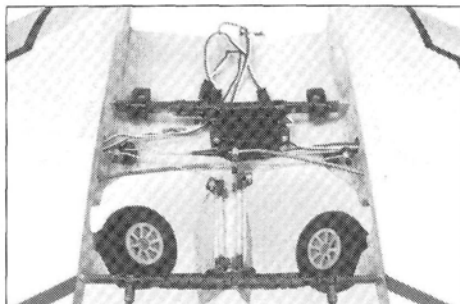
This kit also includes: a machine-cut foam wing; machine-cut balsa stab; joined wing skins (cut to shape); carbon-fiber flex plates for all landing gears; a very high-quality, clear canopy; molded

inlet and tail pipe; cockpit deck; hardware and control hook-ups; separately molded hatch; and an accurate, comprehensive decal sheet that's complete with stencils.

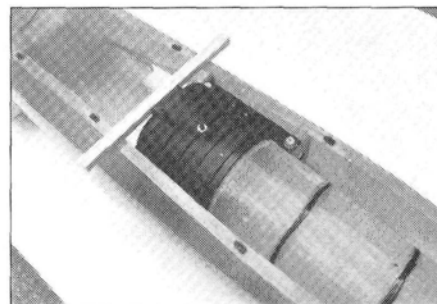
Last, and certainly not least, Bob has developed an explicit, 31-page instruction and operation manual that other manufacturers could learn from. This comprehensive manual covers every assembly and finishing procedure. With words, diagrams and photographs, it takes you by the hand and leads you down the path of construction in a way that you're sure to appreciate. It's with you as you open the box, while you're installing the control surfaces, when you're adding the landing gear, while you're installing the servos, right up to when you're finishing the

model. It then goes that extra mile and walks you through your first flight! The only thing this manual doesn't have is a coupon for a free airline ticket, so you can have B.V. himself right at your side for the first takeoff!

In addition to this manual, the kit includes a set of full-size plans, which I prefer to the traditional method sheets. There's also a smaller manual that fully details the entire landing-gear installation. This covers setting-in the retracts units,



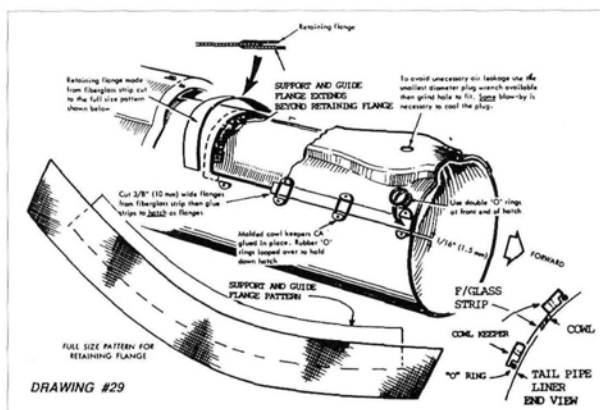
Wing center section shows retract servo and linkage for gear and doors. Although it looks complicated, complete detailed instructions are provided. Sport fliers can forgo complexity and leave doors off.



Viojett fan unit and portion of duct work shown in position. Duct is wrapped with carbon fiber for more rigidity.



Inside Frank's Sabre. Lots of details evident here: throttle servo, feed and pressure lines, and remote needle valve. Important to note that duct work is painted to protect it from residual fuel. "Tunnel Art" by Mike Bacon.



Instructions are well-detailed, consisting of illustrations and photographs.

fastening the struts, setting the servos, making the pushrods from the templates and making those sequential doors work properly.

The magic number of the complete jet, ready to roll, will be right around \$1,400. This includes: the scale struts; the retracts; the tires; BVM's novel fuel cells; a very, very quiet tuned pipe (this is probably the quietest scale jet available at this time); the patented Viojett fan system; a new KBV .82 fan engine; and, of course, the kit.

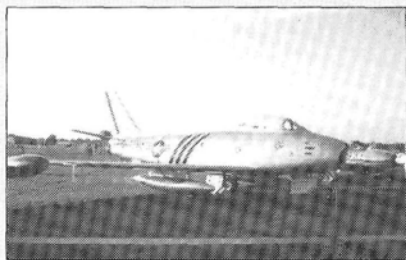
What you can't put a price on is something you can't see, but it's included in every kit: Bob calls it "support." He welcomes the phone calls that allow him to straighten out any problems, and I've found his staff most courteous at all times. As I was building Sabre Jet kit no. 2, I was confused by a few things. Bob took the criticisms in stride and fixed any flaw I discovered. In fact, the last and final plan was the fifth update!

The instruction manual for the Sabre may be the very heart of this kit. Absolutely nothing has been left to conjecture. There are no misleading statements; the photos are clear; and the language is English. Only because Bob doesn't mention it himself, I must offer the following advice: To build this airplane properly, you don't need a degree from M.I.T., but you must have vision in both eyes, a little more coordination than a one-legged duck, and a reasonable command of the English language, a ruler and an X-Acto knife!

Even though this kit has been thoroughly checked out, engineered and designed, you, the modeler, must still chip in a little of yourself to make the whole

(Continued on page 131)

Sabre—the Mustang of Korea?



ONE OF THE BEST-KNOWN warbirds in the world—the North American F-86 Sabre—dates back to the waning days of World War II. Labeled the XP-86, a mockup of a fast, swept-wing jet fighter was unveiled in 1945, and the first production Sabre appeared in May '48. Later that year, Major Robert L. Johnson flew the plane at a record 670.981mph! The 94th Fighter Squadron of the 1st Fighter

Group at March Air Force Base, CA, was the first unit in the U.S. Air Force to put the Sabre into operational service.

When the first major conflict of the Cold War broke out in Korea, the Sabre was called into action. In December 1950, one week after the Russian-built MiGs entered the war, the Air Force sent Sabres into combat. The sleek, high-performance aircraft was asked to do the job it was designed for, and what a job it did! In May '53 alone, when the conflict had reached its climax, some 77 MiGs were shot down without the loss of any Sabres. The eventual end of the Korean War must, in many ways, be thanks to the North American F-86 Sabre jet and the courageous crews who flew them.

SUPER TIGRE X61

(Continued from page 106)

ery. Like the Italian pattern engines, the X61K isn't equipped with any form of separate fuel pump, and this reduces its cost. Either these manufacturers are still in favor of the simpler pipe (or exhaust) pressure fuel systems, or they're not ready to entangle themselves with the varied pumper systems. These emanate largely from Japan and find favor among FAI competitors. The reduced pressure from the exhaust system (rarely above 1 1/2 psi over atmospheric) usually enforces smaller carburetor choke sizes to ensure reliable fuel supply under high-G situations. This restricts hp maxima, though this may become less significant as rpm continue to fall. The up side can be increased reliability and extended engine life; as always, the choice is there for the individual pattern flier. It's clear where the X61K is pitched, and these test results show it to be a strong runner in that area.

Meantime, this particular sample is on its way back to MAN's editor and it will probably power some unsuspecting person's prized pattern plane. I hope that they can use that compression!

**Here are the names of the companies mentioned in this article:*

Super Tigre and O.S./Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

OPS; distributed by Shamrock Competition Imports, P.O. Box 26247, New Orleans, LA 70186. ■

F3E CONTEST

(Continued from page 67)

inches; weight - 54 ounces; wing loading - 16.7 ounces to the square foot; airfoil - Eppler 222; motor - Astro FAI 05; prop - K&W 8x6; batteries - 7-1200 SCRs; motor control - Novak T-1 speed control; connectors - banana plugs; radio - Airtronics 7SP with ATRCS on aileron, elevator and aileron spoilers.

John Lupperger, Sinus kit: 79-inch span; area - 465 square inches; weight - 53 ounces; wing loading - 16.4 ounces to the square foot; airfoil - Eppler 222; motor - Astro FAI 05; prop - K&W 8x6; batteries - 7-900 SCRs; motor control - Novak T-1X; connectors - mil spec gold pins; radio - Airtronics Vision on aileron, elevator and aileron spoilers.

Gary Westland, original design: 71-inch span; area - 375 square inches; weight - 45 ounces; wing loading - 17.2 ounces to the square foot; airfoil - Eppler 374; motor - geared Astro FAI 05; prop - K&W 13x7; batteries - 7-1200 SCRs;

motor control - Becker USA on/off switch; connectors - banana plugs; radio - Cirrus PCM 5 on aileron and elevator.

Lowell Norenberg, original design: 64-inch span; area - 420 square inches; weight - 43 ounces; wing loading - 14.7 ounces to the square foot; airfoil - Eppler 374; motor - geared Astro FAI 05; prop - K&W 13x7; batteries - 7-1200 SCRs; motor control - Hi Sky on/off switch; connectors - Anderson Power Poles; radio - Airtronics 7SP on aileron, elevator, rudder and aileron spoilers.

Hatch Manell, original design: 60-inch span; area - 375 square inches; weight - 44 ounces; wing loading - 16.8 ounces to the square foot; airfoil - Eppler 222; motor - geared Astro FAI 05; prop - K&W 12x7 cut to 11 inches; batteries - 7-900 SCRs; motor control - Becker USA on/off switch; connectors - Anderson Power Poles; radio - Cirrus PCM 5 on elevator, rudder and spoilers.

Tom Copp, original design: 70-inch span; area - unknown; weight - 47 ounces; wing loading - unknown; airfoil - Selig 3021; motor - Astro FAI 05; prop - Sonic Tronics 8x6; batteries - 7-1200 SCs; motor control - Tekin speed control; connectors - Anderson Power Poles; radio - Airtronics Vision on aileron, elevator and aileron spoilers.

Scott MacKenzie, UHU kit: 66-inch span; area - 450 square inches; weight - 45 ounces; wing loading - 14.4 ounces to the square foot; airfoil - Eppler 193; motor - Astro FAI 05; prop - Sonics Tronics 8x4; batteries - 7-900 SCRs; motor control - microswitch; radio - Cox Cadet III on elevator and rudder.

From this list, you'll see that certain equipment and parameters were popular. All the models were powered by the Astro FAI 05; most used either the Airtronics 7SP, or Vision radios. All but four used ailerons, and all except one of these used aileron spoilers for glide-path control. The models were divided almost evenly between those with a wing area of more than 400 squares and those with less than that. Nine of the models used an on/off motor control, and only four used speed controls; 11 used K&W props, which, I'm afraid, are no longer available. Eight used 900 SCRs, and five used 1200 SCs or SCRs. Five of the models were of all-balsa construction; seven had foam cores, and three of these had glass-bagged wings. There were almost as many types of chargers as there were contestants!

The two top models had the most spectacular performances and were a team

(Continued on page 116)

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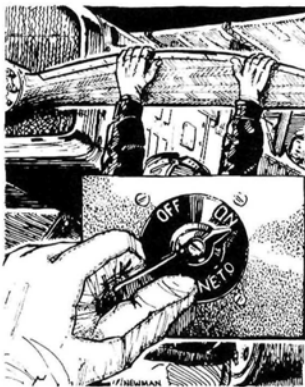
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Golden Age of

by HAL "PAPPY" deBOLT

What Happened to America's R/C Systems?

MILESTONES! WE PASS them every day, and this month's column really is a milestone for me—it's the fortieth! At the beginning, I thought that in six months, I could discuss all the pertinent information and exhaust your interest; but here I am, charging merrily along, nearly three years later! In fact, the subject and your interest seem unlimited! I'm delighted that this has become *your* OT R/C place and, with your input, I'll carry on!

So what have we achieved? We're now united by the Vintage R/C Society, which recently printed its first newsletter and looks as though it's flourishing. In its impressive *12 pages*, the newsletter projects the ideas and enthusiasm of President John Worth and Editor Art Schroeder. Their ideas provide a solid foundation on which to base the organization, and they're relying on the wholehearted support of and information from the many

members. What do the members want from the Society?

Kurt Rose of Cleveland, OH, suggests, quite logically, that the past should be divided into categories—chronologically, and according to the sophistication of the models. (For example, an antique rudder like Good's Guff would perform very differently from Kazmirski's Orion, or even an L.W. Champion.) A classification by dates seems entirely possible; perhaps the Society could address this? Kurt thinks that three categories should do the trick: Antique, Early Bird and Vintage. What do you think? Editor Schroeder offers his ideas on "rudder only" in consider-

able detail. Such flying would raise many eyebrows today! What's your vision of a rudder-only?—perhaps the lazy cruising of a modern glider? Art points out that R-O performance became much more than just controlled flight; aerobatics became very popular as ingenious builder fliers found ways to accomplish all the known maneuvers. We seldom use rudder as an air control today, and it's amazing that early fliers did so well with *only* this to control movement. Art is right when he says that a typical R-O aerobatic performance would astonish those at most modern flying sessions!

With several hundred VR/CS member already aboard, it's onward and upward from here on! Join us!

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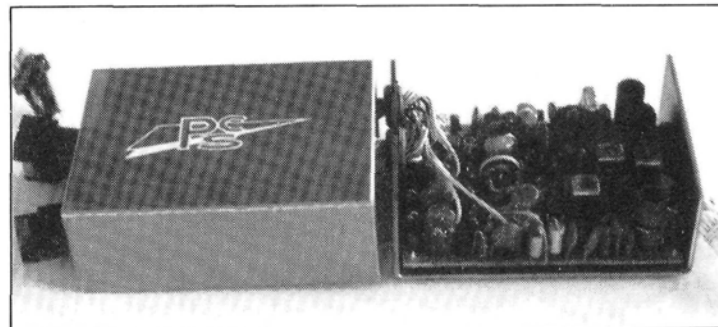
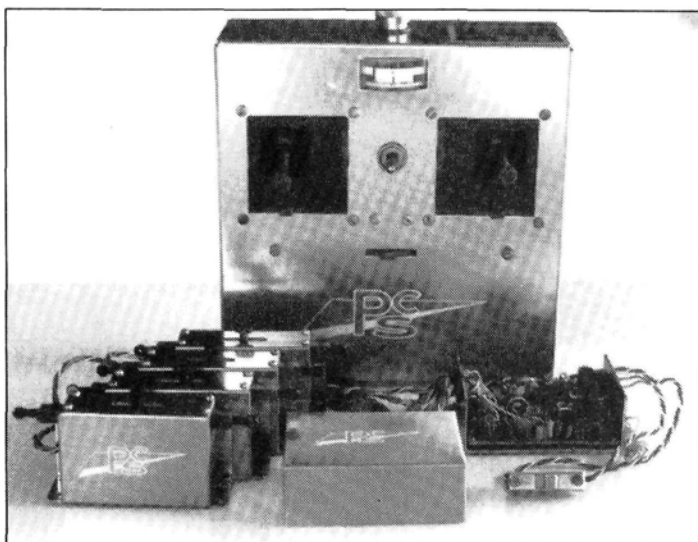
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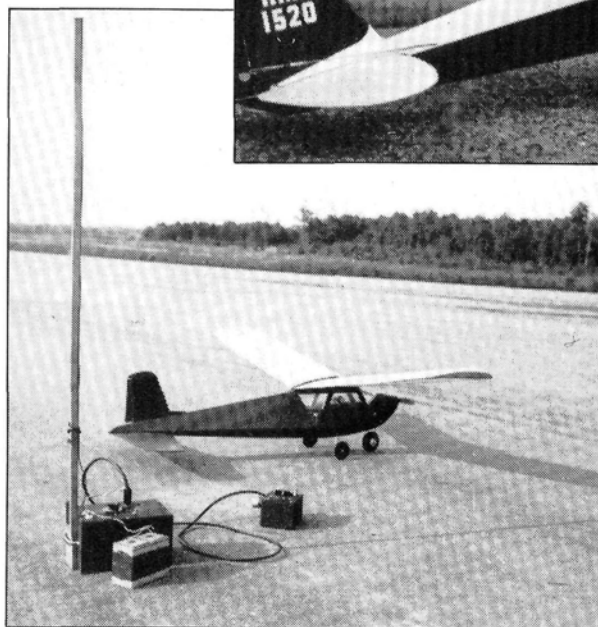
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A MAN advertisement from 1968. System offered is the original; style changed as Kraft systems were updated. All PCS ads featured Charlene in various poses! Note the price compared with today's!



Left: Original PCS digital offering. Selling point was low price. Note messiness typical of this time.

Above: Early PCS receiver was typical for its time. Check the size and multitude of components. (PCS photos by Michael Shabot.)



Rudder-only Rudder Bug (left) and Live Wire Super Cub (above). The Bug would fall into the VR/CS Antique Class, and the Live Wire would be an Early Bird (both on rudder only). See text for discussion.

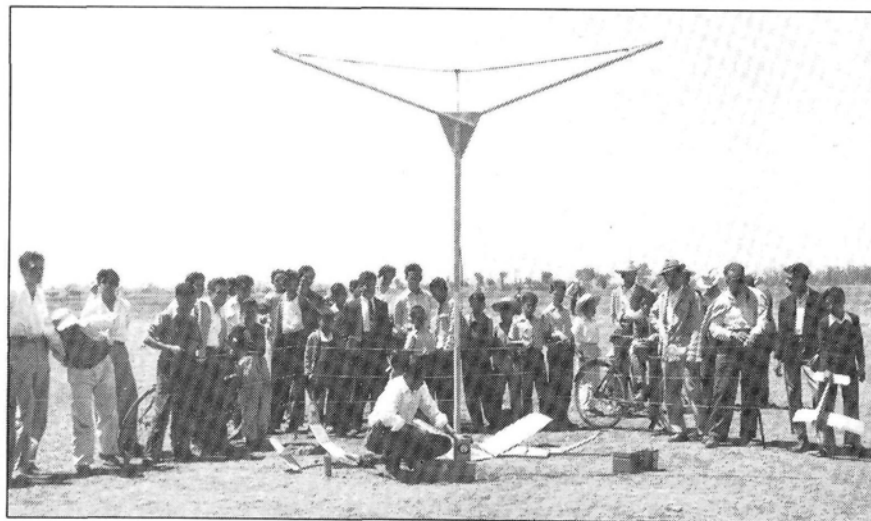
Made in America?

I've already described the beginning of today's digital R/C systems and how digital coding soon dominated R/C (as well as most of today's other electronics!).

Today, with the exception of one brand, all our R/C systems are made abroad by just a few manufacturers: Futaba, Airtronics-Sanwa and JR obviously come immediately to mind. We once had many brands to choose from, but after all this development, we now have far fewer choices, and very little is made in America. When digital proportional first became available,

there were *no foreign brands* available in the USA; in fact, U.S. manufacturers dominated the world with their systems! What happened?—the ascendancy of the Far East. Let's look at how our American

3IM? Not a chance!!



AT YOUR LAST flying session you flipped on two switches, then took off, assured that your flight was under control—routine, right? The early years were so different! As the photo shows, you first had to erect your “dipole” antenna, determine the wind direction and orient the antenna to that. You didn't dare fly off the “ends” of the dipole!

Next, you took out your trusty meter and tuned the transmitter according to the day's ground conditions (ground was a part of the antenna's circuit). With the transmitter tuned, you walked 500 feet away with your model and, with a meter, you tuned the receiver to the transmitter while a helper held the signal key closed. If all meter readings were tolerable, you flew.

Wanted more flights? You repeated the procedure each time, hoping for more success. Things *were* simple! In the photo, the R/Cer is tuning the transmitter: Those dipoles always drew a crowd—someone was about to try one of those newfangled R/C planes!

manufacturers developed to see if we can come up with the reasons for this.

First, remember that *all* of our home-grown companies resulted from the efforts of inspired *individuals* who started from scratch (or nearly so) and built their operations almost single-handedly. Obviously, as production increased, we saw the emergence of corporations, but control remained with their originators. It's interesting to recall that the *major* corporations remained strong until their founders found it advantageous to sell out to conglomerates (very lucrative at one time). You'll see that the policies of the holding companies could be one reason for the demise of some American R/C products.

So what were the popular American brands before the Japanese invasion? I'll attempt to list them in order of popularity (just don't hold me accountable for my statistics; no one has exact records, and I'm sure to overlook some minor operations). Remember that a company's success varied yearly according to its new offerings and accomplishments. These were growth years, and research and development led to giant steps forward for R/C!

Here's a list of the companies with the names of their originators: Kraft Systems (Phil Kraft); Orbit Electronics (Bob Dunham); E-K Electronics (Bob Elliott and Gerald Krause); Micro-Avionics (Don Mathes and Doug Spreng); Proportional Control Systems/PCS (Cliff Weirick); C-G (Frank Hoover); Min-X (Jim Northmore); Controaire (John Maloney); Ace R/C (Paul Runge). Coming after Kraft, Orbit, E-K, etc., Jim Fosgate's Pro-Line was probably the last *dominant* U.S. producer. We once had at least 10 or more thriving R/C brands to choose from instead of the three or four we have today. You had a much greater choice of which color box you wished to trust!

(Continued on page 136)

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F3E CONTEST

(Continued from page 113)

effort of Bob Sliff, Jason Perrin and Jerry Bridgeman (main designer).

The fuselages are made of Kevlar glass and are very strong, even though they weigh only 1 1/2 ounces. The wings are vacuum-bagged, glass, foam cores that weigh only 5 to 6 ounces. Their tail surfaces are built up and then sheeted with 1/20 balsa. They're so light that you can barely weigh them (everything possible is done to keep the models light). Their prop hubs are a short Geist unit that's lighter than any other hub available, and the 9x6 K&W prop was extensively reworked. By reworking the blades and putting them on the Geist hub to yield an 8 1/4 x 6 prop, they were able to keep their amperage draw to about 30 amps. This allowed the use of 900 SCR batteries, but still allowed them to have about 2 minutes motor run (more

time than everyone else was getting with heavier 1200mAh batteries).

The finished models weigh only 34 ounces, so they can climb for a shorter time before entering the course for laps, and, subsequently, they were able to push harder, fly faster, and climb three times for laps. Jason consistently made 15 and 16 laps, and Bob did 13 and 14 throughout the contest. Only one other competitor managed to hit 14 laps, and then only once.

On the thermal part of the event, Jason and Bob both hit their time in each round with relatively short motor-run times. For landings, Jason earned 30s with only one 15-point landing, and Bob hit the 30-point circle every time. This team was well prepared and deserved to win. Luck didn't enter into their victory, and they're to be commended for a job well done.

The members of the Harbor Soaring

Society are to be congratulated on the way they organized and ran the event. This club is the oldest, sanctioned, soaring club in the AMA, and its members have the experience to make this type of event enjoyable for competitors and spectators.

The next event is planned for 1991. There's some discussion about changing the distribution and amount of prize money, possibly giving cash through 10th place. If this happens, it will probably encourage more people to participate. Sound like fun? Start getting ready now; then you might be able to collect some of the prize money in '91!



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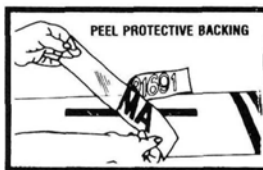
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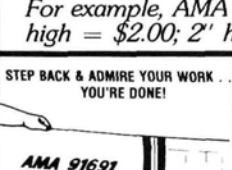
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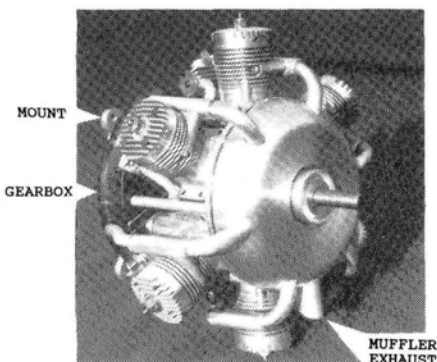
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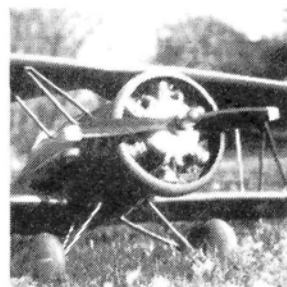
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80" PROCTOR NIEUPORT 28 BIPLANE
86" MONOCOQUE 90A

BUILDING PLANES

(Continued from page 69)

ensure an optimum bond.

At this point, it's important to keep the freshly soldered joint *perfectly motionless* until the molten metal has fully solidified! If moved while cooling, solder hardens with a frosty-looking surface that indicates a greatly weakened structure. "Frosty" solder is as brittle as a cornflake! If one of your solder joints moves during cooling and looks "frosted," just re-melt it and allow it to cool undisturbed. It will then be OK.

When joining two pieces of music wire, it has long been customary for modelers to wrap the junction snugly with thin, bare, copper wire before soldering. The copper wrap reinforces the solder, just as steel bars reinforce concrete. When using this technique, make sure the copper wire is just as sparkling clean as the other parts of the joint.

With Sta-Brite solder, however, wire wrapping isn't really necessary. This solder is mighty strong stuff! The flux that comes with it, though, is quite acidic and rapidly rusts steel wire (as my friend

Emmett Fry recently discovered, the hard way!). But Sta-Brite doesn't really need acid flux in a new method I've just worked out:

1. Thoroughly clean the parts to be soldered, then immediately coat the areas to be soldered with *resin* soldering flux.

2. Tin the fluxed areas with 60-40 solder; then, while they're still hot, wipe off as much surface solder as possible. (Wadded toilet paper works well for this.) You want a microscopically thin surface layer of 60-40 covering the areas to be soldered with Sta-Brite.

3. Now you can assemble the pieces and permanently solder them together with Sta-Brite (using more resin flux, if necessary).

4. One warning about Sta-Brite solder: It takes about four times as long to solidify as 60-40 does. Be sure to keep the components absolutely still until the solder has completely cooled!

I tested the strength of piano-wire joints made this way, i.e., without any copper wire-wrap reinforcements, and I was amazed at the strength of the bond! With effort, I could deform the juncture, but I couldn't pull the pieces apart.

There! No more reason to be sad about soldering!

AERO-SPORT 40

(Continued from page 81)

Bert the transmitter and I grabbed the camera.

The Aero-Sport has no bad habits. Although it isn't for beginners, you can slow it down comfortably for landings, and takeoffs are totally uneventful. In the air, it will do what a good, sport, shoulder-wing plane should do: loops, rolls, split-S turns, Immelmans, Cuban-8s, stall turns, wing-overs, inverted flight that requires just a little down stick, and on and on...

That's about it. You've no doubt figured out that I really like this plane and that I'm looking forward to flying it for a long time. The Aero-Sport can be built quickly, it flies really well, and it's not too expensive. You'll need a .40-size engine, a 4-channel radio and about \$90 for the kit, the covering and miscellaneous components. Enjoy!

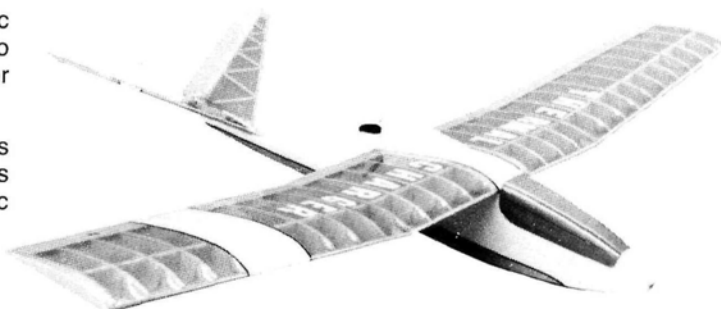
(Continued on page 126)

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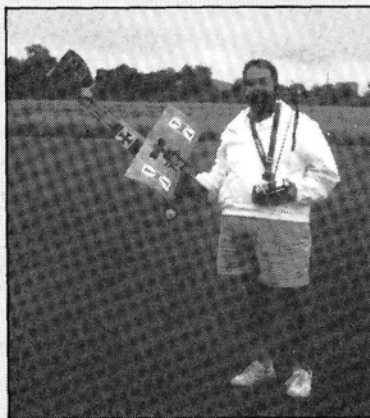
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Left to right: CD Bob Kopski and KRC President George Poos accept certificate of achievement presented to KRC from AMA 73 District III VP Bob Brown.



Larry Sribnick (SR Batteries Inc.) with his Top Flite Elder.



Ken Stinson with his scratch-built deHavilland DH2. Astro .25/belt drive; 14 1200 cells.

10th ANNUAL KRC ELECTRIC FLY-IN

Weather never dampens the spirits of electric fliers; next, they'll be harnessing the lightning to recharge their packs!

SOMEONE ONCE SAID that you can't please all the people all the time. I don't know who said it, but I believe it's true, and I also believe that over the years, the Keystone R/C Club, in Hatfield, PA, has come close to pleasing everyone with its KRC Electric Fly. The 10th Annual KRC Electric Fly is now history, but before I tell you more about it, I'll quickly look back 10 years to the time of its inception.

Ten years ago, electric flight was still very new, but KRC enjoyed the unusual position of having a large number of electric fliers in its ranks. This was largely owing to the influence of KRC member Bob Kopski. Bob had been playing with electric flight for a number of years (he even wound his own motors in the early days), and he had already given up fuel power in favor of electric. Another KRC member (Bob Trockels, I think) suggested that KRC should have a FunFly exclusively for electric models so that they could show what could be done with electric power.

After much discussion, the concept was formed up. KRC decided that the priority should be *fun*, the second objective, *education*, and the third, the provision of some *competition* for those so inclined. Above all, it had to be a high-quality meet. They also included an Electric-Fly Clinic to provide help for new electric modelers and answer questions from potential electric fliers. Thus, the 1st Annual KRC Elec-

tric Fly was born, and I think it was the first electric fly-in held anywhere.

Over the last decade, the popularity of electric planes has grown, and so has the number of electric-fly meets. Many emulate the successful KRC format, and KRC supports this. KRC has maintained its basic format, but refined and improved it where possible. One of the biggest changes was the adoption of a two-day format, and this year, the field was also open on Friday afternoon for casual flying.

The 1st Annual KRC Electric Fly had approximately 17 participants (14 KRC members and three guests); this year's had 117 registered fliers—despite the rain. On Saturday, many planes never left the cars, and a number of pilots didn't register because of the rain, but about half an hour after the meet started, the skies opened. The rain wasn't constant, but it poured at

times, and CD Bob Kopski occasionally considered ending the meet; then the rain would lighten, and someone would launch an airplane! Those electric fliers sure are diehards!

By the end of the day, 86 fliers had registered, and many aircraft were on the flight line under canopies. Although conditions weren't ideal, many flew for fun, and all the organized events went ahead as planned.

Even though the Electric Fly is sanctioned as one event, a participant may come for one or both days. As in the past, each day had separate judging and prizes. Each day had two sign-up events and two "you just fly, have fun, and we'll watch" events. The sign-up events on Saturday were Most Rolls (in 60 seconds), and an All Up, Last Down event. The All Up, Last 73 Down had one flier on each of 10 frequencies, and participation was by drawing lots.

Participants were spread out across the field, and everyone launched at once. The last one down was the winner. This event always draws a lot of spectator interest, and the winners of these two events received plaques and a cash prize: from \$50 for 1st to \$10 for 4th. In addition to these two events, KRC judged all airplanes to find the Best Aerobatic (pilot) and the Best Scale. Plaques and prizes were awarded to 3rd place.

After the All Up, Last Down event, there was a lot of interest in John Fleming's Electra, and as the crowd gathered around, he revealed the secret of his

by JOHN HICKEY

10th ANNUAL KRC ELECTRIC FLY-IN

long motor run. John used four, 6-cell, 1250 SR magnum battery packs. Instead of a speed control, he used a servo to operate a Radio Shack center-off toggle switch to switch the battery packs in and out. He switched one set of batteries in for two minutes (maximum); then, when he wanted power again, he used the other



Bob Markle (RJM Systems) preparing to launch David Frazier's 1940 Goldberg Sailplane. Astro .40 geared; 18 1200 cells.

set of packs. He alternated packs this way until all packs had been drained. This allowed him to keep the batteries cool and get maximum power from them. Basically, he packed a lot of batteries into his Electra glider, and he found an ingenious way to get the most out of them.

A hundred and thirty guests enjoyed the Saturday night banquet, which had been reinstated after a hiatus of two years. No formal entertainment was provided; instead, KRC opted for socializing. I enjoyed presenting door prizes during the social time, and AMA District III Vice President, Bob Brown, presented KRC with a certificate of appreciation for its efforts to promote electric flight during the last 10 years.

Sunday morning started with a light drizzle, but by the time I reached the field, it had almost stopped. Activities got off to a seven o'clock start, with just a little mist in the air. The weather gradually improved, and the sun actually poked through the clouds at times. Pilots took advantage of this, and the sky filled with airplanes—at least six or seven planes at any given time.

On Sunday, the sign-up events were

Most Loops (1 Minute) and Maxi-Flight, which was one continuous flight task. Pilots launched and then flew 4-minute flight segments; after each segment, the model was landed and then immediately re-launched. The greatest total of air time (number of 4-minute segments, plus fraction of last 4-minute segment) won.

The other two events judged on Sunday were Overall Most Impressive and Most Unusual.

There were so many fine models and pilots there that I just can't remember them all, but here are some that come to mind:

As always, Keith Shaw (Ann Arbor, MI) put on a great show. He always brings something new and exciting and, this year, he brought his original-design flying wing—King Crimson. It has a 126-inch span, weighs 10½ pounds, and is powered with four Leisure .05s on gear drives. Power is controlled with a Jomar SC-4 speed control, and it also has retracts.

Whatever Keith flies, he always puts on a great show, including crowd-pleasing aerobatics. In addition to his flying wing, he brought his Gee Bee, his Spitfire, his deHavilland Comet twin, and his Stearman biplane (complete with smoke!).

Another great scale model was the beautiful deHavilland Turbo Beaver of Lloyd Roberts (Camden, MA). It weighed in at 11½ pounds, and was powered by an Astro .60 on 28 1800 cells. The craftsmanship was just outstanding, and Roberts is also an accomplished pilot.

Ellis Grumer (Phillipsburg, NJ) is also a super builder, and this year's addition to his fleet was a very nice Curtis Seagull.



Overall Most Impressive winners (left to right): David Martin and Tony Fiori. Missing from photo: Lloyd Roberts.

Another beauty was Everett Rubenounst's (Foster, RI) scratch-built Velie Monocoupe.

KRC's Ken Stinson also has a reputation for bringing something new and unusual each year. This year, he brought a scratch-built deHavilland DH2, which is



Some of the beautiful aircraft given away in the Electric-Fly Raffle.

a WW I pusher design. It's powered by an Astro .25 on a belt drive with 14 1200 cells. There were so many great gliders, old-timers, aerobatics and scale ships that I wish I could mention them all, but space and my memory hold me back. My apologies to those I've omitted.

When the weekend was over and we had time to think about the event, we at KRC asked ourselves if it was all worth it. Based on feedback from the participants, our answer is a resounding yes! It's a lot of work, but seeing everyone's enjoyment makes it all worthwhile. The vast majority of the comments we heard were positive; many mentioned the good organization, the cleanliness, the quietness, and the relaxed, friendly, great bunch of people who attended.

On the negative side, many pilots complained about the weather, and one individual wanted onions for the hot dogs! Perhaps we'll have them next year! Following previous suggestions, we tried an August date several years ago, and we had record high temperatures and very high winds!; you just can't guarantee the weather.

Several people mentioned frequency control, and we tried to improve that area this year. At any large meet, frequency control (or waiting for your turn to fly) can be a problem, so this year, KRC imposed a 20-minute limit on the time anyone could use a frequency pin. This did help, but it could still mean a 60-minute



Left to right: Keith Shaw and John Sermos (Sermos R/C Snap Connectors) deep in a technical discussion. Keith's fleet of planes rests in the background.

Most Rolls (1 minute)

1st	Brad Baylor, Fairfax Station, VA	46
2nd	Chris True, Peekskill, NY	44
3rd	Keith Shaw, Ann Arbor, MI	40
4th	Dick Allen, Endicott, NY	37

All Up, Last Down

1st	John Fleming, Liverpool, NY	Goldberg Electra
2nd	Steve Syrotiak, North Branford, CT	Graupner Sinus
3rd	Karl Benson, Wyomissing, PA	80-inch Playboy
4th	Charles Sylvia, Middleboro, MA	DSC Lucifer

Best Aerobatic

1st	Keith Shaw, Ann Arbor, MI
2nd	Chris True, Peekskill, NY
3rd	Brad Baylor, Fairfax Station, VA

Best Scale

1st	Lloyd Roberts, Camden, ME	Turbo Beaver
2nd	Keith Shaw, Ann Arbor, MI	Stearman
3rd	Ellis Grumer, Phillipsburg, NJ	Curtis Seagull

Most Loops

1st	Rich Simpson, Pittsburgh, PA	23
2nd	Everett Rubenoust, Foster, RI	20
3rd	Don Belfort, Clay, NY	19
4th	Jim Parker, Rockaway, NJ	18*

*After tie-breaker with Keith Clark-Howell, MI.

Maxi-Flight

1st	John Fleming, Liverpool, NY	28 min.
2nd	John Mountjoy, Winston Salem, NC	21.35 min.
3rd	Vernon Wood, Doylestown, PA	19.37 min.
4th	Hogan Eng, Bristol, CT	18.19 min.

Overall Most Impressive

1st	David Martin, Brentwood, TN	Graupner ASW22
2nd	Lloyd Roberts, Camden, ME	Turbo Beaver
3rd	Tony Fiori, Zieglerstown, PA	P51 Mustang

Most Unusual

1st	Keith Shaw, Ann Arbor, MI	King Crimson (flying wing)
2nd	Ken Stinson, Telford, PA	deHavilland DH2
3rd	Ron Stein, Norristown, PA	Goblin

wait if you were fourth in line for a frequency. We'll be happy to consider suggestions on how to improve this situation, so let me know if you have any bright ideas. The positive comments far exceeded the negatives ones, and we suggest that more clubs try an electric fly type of event, because a great group of fliers will show up.

The 117 registered pilots brought over 270 aircraft (electric 73 fliers often come equipped with three or more planes). Several pilots even had as many as six or eight aircraft! We had pilots from 17 states and Canada, and rumor has it that



Lloyd Roberts with his beautiful deHavilland Turbo Beaver. Astro .60; 28 1800 cells; 10 1/2 pounds.

there were visitors from Australia, but I didn't see them. I can, however, verify that Charles Evans came 1,300 miles from Clarcona, FL, to join us.

Our survey revealed that a lot of old-timers must have been present, because the collective time in modeling was 2,207 years. Some of the old-timers have been modeling for more than 40 years! The average experience with electric flight was just 3.86 years. (This varied from a low of "just getting started" to a maximum of 15 years.) This suggests that electric power is still relatively new

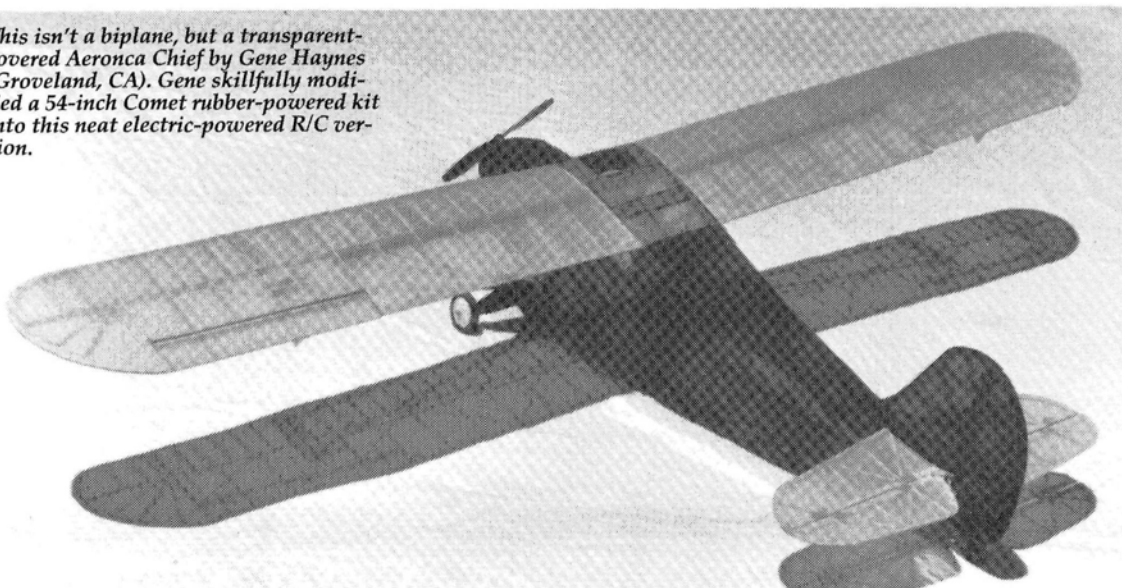
(Continued on page 143)



Small Steps

by JOE WAGNER

This isn't a biplane, but a transparent-covered Aeronca Chief by Gene Haynes (Groveland, CA). Gene skillfully modified a 54-inch Comet rubber-powered kit into this neat electric-powered R/C version.



Landing Gears, Convertibles and Plans Sources

HERE'S SOMETHING FLIERS of small R/C airplanes have needed for a long time: Sullivan Products* now offers Skylite wheels, and these wheels are *light*! They weigh even less than the lightweight Ace R/C wheels I've been using on most of my 1/2A models for the last 10 years, and they're only a smidgen heavier than the Williams Brothers Vintage Wheels that so many old-timers put on their R/C-assist free-flight airplanes to keep weight to a bare minimum.

Skylite wheels are far lighter than most other brands on the market. Although Dave Brown's Lite Flite foam-tire wheels are even lighter and a little more resilient, I prefer the new Sullivans: They look more like airplane wheels, and the rubber-like plastic skin prevents water, fuel and dirt from being absorbed by the foam interior. Skylite tires will never turn into reservoirs of oil and sludge!

These wheels come with ingenious "Shurlock" wheel retainers; unfortunately, the Shurlocks are rather large (approximately 1/2 inch in diameter) for smaller airplanes. In fact, they're so big that they cover up most of the hub on the smaller Skylites.

Speaking of model wheels and landing gear, let's consider the severity of impact forces to which these model components are subjected. A standard carpenter's hammer weighs approximately 24 ounces, and, when driving a tenpenny nail, it moves at about 25 to 30mph. These weight and velocity numbers are similar to those of small R/C airplanes. Is it any wonder that wheel retainers come off so frequently; or that single-strut, wire, landing gears get bent out of shape in rough landings?!

The best way to absorb the shock that model landing gear encounters is with the



Sullivan's Skylite wheels come in sizes from 1 3/4 to 3 inches. As the scales show, a pair of the smallest ones weighs a mere .70 ounce.

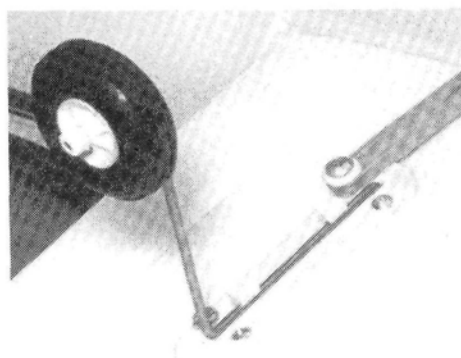
"torsion bar"-type of landing-gear wire. (Randy Randolph wrote about this in a recent issue of *MAN*; I also incorporated it into my all-sheet-balsa Osprey 1/2 A R/C biplane, which was featured in the March '88 *MAN*.) For its size, this type of landing gear can take a lot more punishment than any other I know of—provided that it's correctly designed and installed!

It's important to remember that every bit of impact that the wheel suffers in a hard landing is transmitted through the torsion part of the wire and has to be absorbed at the mounted end. This is why it's vital to make the end that's opposite the axle reasonably long and to attach it to something *firm*, e.g., a plywood doubler.

Too many kit models with torsion-bar landing gear have excessively short attachment ends, especially designs in which the gear mount into the wings. The problem is *leverage*. Say the airplane's landing-gear strut has a 3-inch length (measured from the side) below its torsion section. If the attachment end is only 1/2 inch long, it has to withstand *six times* the wrenching force that the axle encoun-

ters; however, if the end opposite the axle is 2 inches long, its load is just 150 percent of the axle's. This illustrates the benefit of making the longest attachment ends you can find room for when you bend torsion-bar landing-gear wires for your R/C models.

While we're on the subject, you should know that the music-wire material we customarily use for our models' landing gear isn't equally strong in all directions of stress. Owing to the way that it's made, music wire is about $2\frac{1}{4}$ times stronger in torsion than it is in bending. This is another excellent reason for using torsion-bar landing-gear wires rather than the more common "V" type.



A typical wing-mounted, torsion-bar-type, landing-gear installation. This one is on a Cox Hobbies, .049 Typhoon, ARF R/C model.

Upheaval Among the Converts?

In a recent "Small Steps" column, I advised against trying to make R/C conversions of the scale rubber-powered model kits manufactured in profusion by companies such as Comet and Guillow. Several readers disagreed with me; some even sent photos of such airplanes they'd built themselves, and they showed impeccable workmanship and excellent flying ability. I didn't mean to imply that the job of converting a rubber-powered model to R/C is impossible. My point was simply that it usually requires too much redesign work and replacement of materials, and so it's preferable to buy a kit specifically designed for R/C flying.

Herb Clukey's Flyline* model designs



A pair of excellent $\frac{1}{2}$ A (36-inch-span) R/C kits: Sterling's F4U-1A and Pilot's Baby. Both are well-engineered and stable, reliable fliers.

are excellent examples of attractive, out-of-the-ordinary, fine-performing R/C airplanes for small engines. Another well-engineered and extremely good-looking scale R/C model is Sterling's* 3-foot-span F4U-1A Corsair. The plans show a Cox .049/.051 for power, but there's plenty of room in the nose for a "throttle-able" .10. The latter would probably be a better choice of powerplant anyway, since the Corsair's radial cowl has a diameter of almost 4 inches, and that renders ineffective a mighty large percentage of the 6- or 7-inch prop disc area of a $\frac{1}{2}$ A powerplant! A .10 can swing an 8-inch (or even larger) prop, particularly if it has a diesel engine. (Another advantage of using, say, a PAW .10 diesel in Sterling's Corsair is that its fuel won't bother the vacu-formed plastic cowl.)

Another quality $\frac{1}{2}$ A R/C kit I recommend, both for its design and engineering, is Pilot's* Baby. Although it isn't a scale model, this Japanese-made, 36-inch-span, R/C airplane has scale-like proportions. With a little extra work, it could be readily converted to an almost-scale Curtiss-Wright Sedan.

We Love it When Plans Come Together!

I get a lot of mail from readers who were modelers years ago, dropped out for a while, and have once again taken up the hobby. Many of these people fondly remember a favorite model design from yesteryear and ask me where they can buy the kits, or at least the plans, for these old airplanes.

John Pond's Old-Time Plan Service* sells copies of the full-size plans for about 90 percent of all the model-airplane designs ever kitted or published in the U.S. Although he doesn't have everything, a new catalogue I've just received from Gleason Enterprises* seems to supply just about anything that John doesn't. The Gleason catalogue costs \$2, and it's well worth the money!

Dick Gleason has acquired most of the original artwork for the old *Air Trails* and *American Modeler* full-size plans, which have been unavailable for many years. Gleason also has plans for all the pre-war Ace Whitman model kits, both scale and non-scale. Enlarged versions of these would make excellent off-the-beaten-track R/C models, and Dick can enlarge them for you, to any size within reason.

Dick has a nearly complete file of U.S. model-airplane publications dating back to the '20s, and he's made a card index of all the scale models published in these magazines. If you need help locating a scale-model design from an old magazine, Dick will send you a copy of his file card on the airplane for \$1. He can even have the original magazine plan photographically enlarged to its full size. Of course, this could be quite expensive if the airplane you're looking for has an 8-foot span, but most of Gleasons' plans are quite reasonably priced (\$5 to \$10, plus postage).

Dick Gleason told me about another product that should be of interest to "Small Steps" readers. Guillow* sells a pair of 1x14-inch model building boards made from reinforced hard balsa. The 3-foot-long board sells for \$14; the 4-footer costs \$17 (add \$4 postage and handling for each). If you measure the dimensions of your model components, you'll find that a mighty big airplane can be constructed on Guillow's building boards!

*Here are the addresses of the companies mentioned in this article:

Sullivan Products, P.O. Box 5166, Baltimore, MD 21224.

Paul K. Guillow, Inc., Dept. WB, P.O. Box 229, Wakefield, MA 01880.

Flyline Models, Inc., P.O. Box 2136, Fairfax, VA 22031.

Sterling Models, 3620 G St., Philadelphia, PA 19134.

Pilot; distributed by Global Hobbies, 18480 Bandler Circle, Fountain Valley, CA 92728.

John Pond's Old-Time Plan Service, Box 90310, San Jose, CA 95109.

Gleason Enterprises, 1106 Tenth Drive, S.E., Austin, MN 55912. ■

We think many of our readers have ideas that are worth sharing. How many times have you read an article and said, "I could do that!" or "That's not the only way to do that; my way is easier!" Could very well be!

Here's your chance.

We're expanding **Model Airplane News** and are looking for additional contributors to help us accomplish this objective. Of key importance is the ability to take good photographs; the writing we can help you with. Interested? It's much easier than you might think!

Let's hear from you. Send in your ideas, articles, thoughts and photos; we're looking forward to it.

Rich Uravitch
Model Airplane News
Air Age Publishing
251 Danbury Road
Wilton, CT 06897

EDITORIAL OPPORTUNITY

Air Age Publishing, Inc., publisher of **Model Airplane News** and other hobby-related publications, is looking for a creative, self-motivated individual who is interested in a magazine career. You will work on **Model Airplane News** and related special publications and books.

You must have an in-depth knowledge of the R/C hobby, and experience in writing, editing and photography is preferred. This is a great career opportunity with a fast-growing company. Send your resume to:

Personnel Manager
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251 Danbury Road
Wilton, CT 06897

AERO-SPORT 40

(Continued from page 118)

*Here are the addresses of the companies mentioned in this article:

Midwest Products, P.O. Box 564, Hobart, IN 46342.
Satellite City, P.O. Box 836, Simi Valley, CA 93062.
Futaba Corporation, 4 Studebaker, Irvine, CA 92718.

SR Batteries, P.O. Box 287, Bellport, NY 11713.

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

Sullivan Products, 1 North St., Baltimore, MD 21224.

Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616.

Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Northeast Aerodynamics, 61C Lebanon, Sanford, ME 04073.

Dynaflite, P.O. Box 1011, San Marcos, CA 92069. ■

HELI WORLD CHAMPS

(Continued from page 95)

pretty Roll made up for it. Started the 180 Auto at lower altitude than Europeans.

4) 228.5, Sensui, Round 3. Textbook one-and-one-half pirouette at the top of the 540 Stall Turn.

4) 228.5, Youngblood ('87-'88 Champ), Round 4. Very impressive takeoffs and locking-in at altitude for the hovering maneuvers. Lowest entry and exit altitudes of any aerobatics flown at this contest.

4) 228.5, Schoonard (USA), Round 4. The crowd applauded one of the best Rolls of the contest. A sequence of nine very good maneuvers with no major flaws.

7) 224.5, Sensui, Round 2. Maintained high airspeed through the Loop. Nailed the 540 Stall Turn as he would the whole contest.

8) 222.0, Dobashi, Round 2. The 540 Stall Turn elicited a cheer from the crowd. Very precise and slow exiting the Roll.

8) 222.0, Youngblood, Round 3. Flying lower and closer to the judges than the Japanese made for a very impressive presentation, especially during the Roll.

10) 219.0, Gorham (USA), Round 4. Superb altitude control in the hovering maneuvers. Missed vertical going up in the Rolling Stall Turn.

11) 218.5, Dobashi, Round 1. A very circular Loop and the best Roll of the first day.

12) 217.5, Ishikawa (Japan), Round 4. Exit from Loop slightly off course. He extends the landing gear of his Bell 222 before he kills the engine for the Autorotation.

Summary of incidents:

Engine problems in the hot, humid air plagued many pilots, including Heim in

round 1 (his Lockheed 286 misfired and twitched all through the aerobatic maneuvers); Wright in round 1 (who passed and took a zero on the Rolling Stall Turn rather than chance it with a sick engine); Verplanke (same round; engine sputtering); Lehtinen in round 4 (whose engine ran very lean after the Horizontal-8); and Verplanke again in the final round (he had to end his flight after the 540 Stall Turn when his engine leaned out).

At least two pilots zeroed their 180 Autos because their engines weren't stopped at touchdown: Gorham and Woodward in round 1.

Start box and safety incidents: Round 1: Verplanke's throttle momentarily went out of control during the taxi-out, and the judges granted him a restart later in the round when he claimed radio interference. His teammate Verhagen had a similar occurrence.

Round 2: Prange flew his helicopter behind the safety line, and the line official sounded the signal horn (the contest's only "black flag"). Youngblood's Split Ranger tail rotor let go very loudly in the start box, but he was able to switch to back-up equipment in time to put in an official flight.

Round 4: While taxiing out to the square, Flammang dropped his transmitter below his waist when the strap to the tray came loose. The throttle stick struck his thigh, and his Lockheed 286 consequently jumped toward the judges. Flammang's caller quickly came to help him by supporting the radio and re-setting the stick. In a few moments, the judges ruled that taxiing procedure had been violated on two counts: The helicopter had touched the ground before reaching the center of the square, and the helper had touched the pilot's radio. The wayward strap earned Flammang a zero for the round. Maldonado didn't attempt to fly in the last round because of radio battery problems.

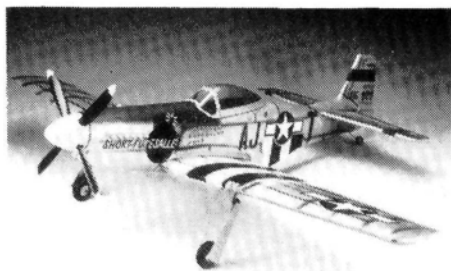
Rough landings: Lieu's machine suffered a failed rotor-head link, and his Nova skidded and bounced in after the Auto (cosmetic damage). Lehtinen's 180 Autorotation attempt ended with a blade strike and a ground loop (minor damage). Kastiel crashed his X-Cell in evening practice and was up all night making repairs.

Miscellaneous eyebrow-raisers: Round 1: Bliss's Kalt came so close to the judges' canopy that one of the officials thought the safety horn should have been sounded. No foul was called, and Bliss scored a complete flight.

Round 3: Verplanke's poorly running

(Continued on page 130)

Product News

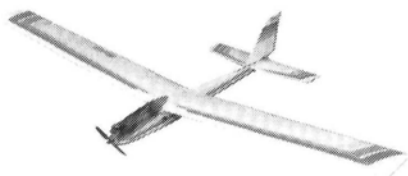


INDY P-51 Mustang ARF

Indy's new Lion Models P-51 Mustang ARF has a built-up wing with a thin layer of foam-board covering and a colored layer of plastic film. The stand-off scale P-51 comes complete with tank, spinner and wheels. The 56-inch-span Mustang, which requires a 4- or 5-channel radio and a .40 to .50 2-stroke engine, is finished in an attractive silver with D-Day invasion-stripe color scheme.

Price: \$259.95. Order no. 11772.

For more information, contact Indy, 10620 North College Ave., Indianapolis, IN 46280.

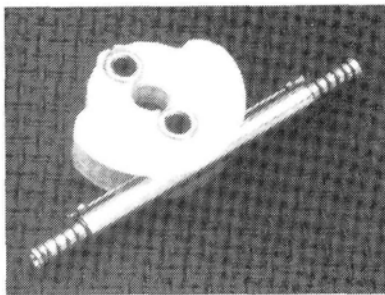


ROYAL PRODUCTS ARF Series

Royal-Air offers three new additions to its ARF series. The planes use a balsa/ply framework with a pre-painted polyester cover. PowerSoar is a gas-powered sailplane that's easy to assemble. EasySoar, designed for light-duty, high-start use, is a good beginner or fun-fly aircraft. ElectroSoar is easy to fly, can be assembled quickly and offers clean, silent electric power. The ElectroSoar comes complete with motor, folding prop/spinner and wiring harness, and all have exceptionally docile flight characteristics.

Price: Electro Soar, \$124.95; EasySoar and PowerSoar, \$109.95 each.

For more information, contact Royal Products, 790 Tennessee Avenue, Denver, CO 80223.



MODEL PRODUCTS Line Drive

Line Drive converts rotary servo output to linear output without adding backlash or friction. With two screws, it's easily mounted on a servo arm. Two versions supply .475 inch or .580 inch total travel for 90 degrees of servo rotation. Linear output eliminates lateral motion and reduces pushrod stroke at servo extremes, and this results in reduced sensitivity at neutral for easier flight trim. There are no gears to wear out or break.

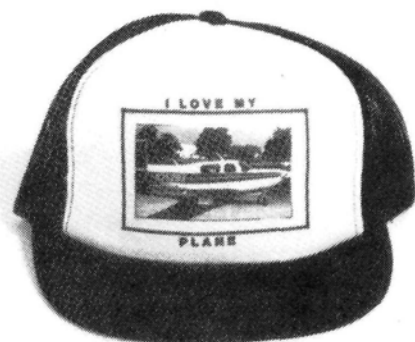
For information, contact Model Products Corp., P.O. Box 100, Allamuchy, NJ 07820.



HOBBICO Bullet Glues

Hobbico announces a new line of specially formulated CAs that are manufactured exclusively for hobby use. They work well with porous (e.g., balsa) and non-porous materials (fiberglass, plastic, etc.). Bullet glue is available in thick and thin formulas and in 1- or 2-ounce bottles. Bullet Activator, which speeds up the curing time of all CAs, and Bullet Debonder, which dissolves all CAs, accompanies the Hobbico Bullet Glue line.

For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

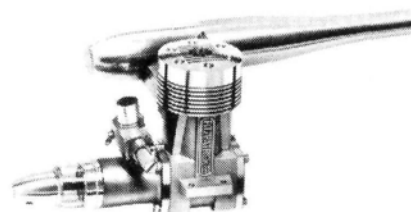


S.M. DAVENPORT Personalized Cap

Just send us your favorite photo or drawing—no bigger than wallet size (no negatives, please), and S.M. Davenport will print the photo on a cap in blue, brown, black, or red tones. Up to six words can be printed at no extra cost. The adjustable caps come in blue, brown, black, or red. Please indicate cap color and photo tone when ordering.

Price: \$9.95.

For more information, contact S.M. Davenport, 14031 Cerise, Suite 203, Hawthorne, CA 90205.

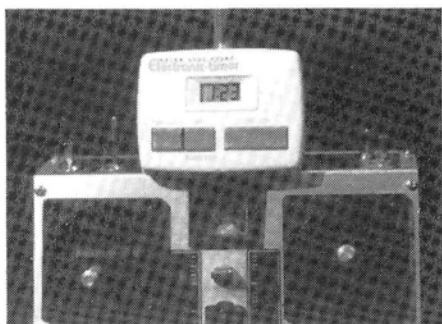


FITZPATRICK 61-ABC Engine

The Fitzpatrick 61-ABC engine is a 61-cubic-inch ABC with real chrome. Its range is 2,000 to 20,000rpm (highest torque: 10,000 to 14,000rpm), and it features all aerospace investment castings. The 61-ABC offers easy operation, high-tech carb, easy idle, reliability and longevity. Other features include CNC-machined parts, double ball bearings, thermal-dwell heat-sink head, muffler, glow plug, aluminum prop-spinner nut and a balanced crankshaft.

Price: \$298, plus \$4.95 for shipping and handling.

For more information, contact Fitzpatrick, 2120 Bentley, #303, West Los Angeles, CA 90025.



GENSAM EXPORTS Extra-Loud Timer

This countdown timer is several times louder than most other timers. It has extra-large buttons to facilitate setting, starting and stopping, yet it's only slightly deeper than most. It uses one AA battery, which is included. Club discounts are available.

Price: \$14.95, plus \$1.50 shipping and handling (Connecticut residents add 8% sales tax).

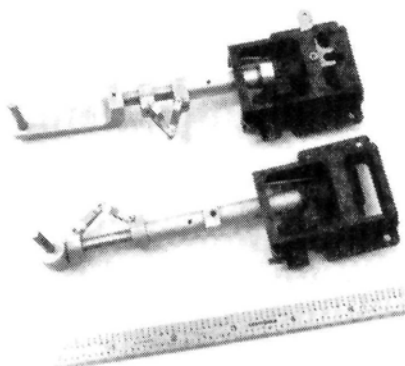
For more information, contact Gen-Sam Exports, Department A, P.O. Box 3841, Danbury, CT 06813.



PROCTOR ENTERPRISES Scale Wire-Spoked Wheels

Proctor Enterprises announces a new line of scale, wire-spoked wheels. Features include scale rim and hub sections, as well as stainless-steel and brass spoke assemblies. Sizes range from 4 to 7 1/2 inches in diameter, and prices start at \$8.95 a pair.

For more information, contact Proctor Enterprises, 25450 N.E. Eilers Road, Aurora, OR 97002.



BOB VIOLETT MODELS Mechanical Retracts

Modeled from carbon-fiber nylon, these BVM mechanical retract units are very light and low in profile. The BVM Sabre jet spawned the need for this new retract system, but it has applications to many other models, both jet- and prop-powered. In addition to the low profile (less than 1 inch), its advantages include: side actuation (which keeps the pushrod clear of the wheel); scale-looking drag-link operation; and the ability to accept scale diameter struts. The nosegear is available in both 90-degree twisting format or standard. Retraction angle isn't critical because the up-lock is provided by proper geometry of the actuating rods on the servo wheel. BVM recommends that you use the Futaba 136G retract servo. The units are shown with the specially manufactured Impact Engineering struts, which are available to fit the Sabre.

For more information, contact Bob Violet Models, 1373 Citrus Road, Winter Springs, FL 32708.



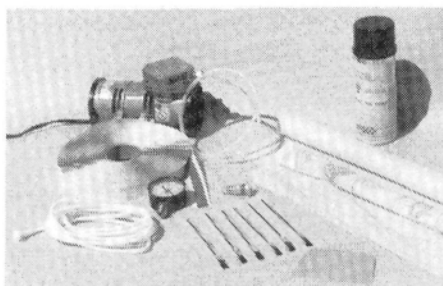
SUNSHINE HOUSE Air Force Stories

After having been out of print for more than a decade, the Eighth, the Thirteenth and the Fifteenth Air Force Stories have been republished and are now available

again. The books have been reprinted in the original format with a 50th Anniversary Commemorative logo added to the cover. In text and photographs, each book presents a broad, historic overview of the respective Air Force units, including coverage of the men and aircraft involved. Aviation historian Kenn Rust compiled the illustrated narratives from official, unofficial and personal records. Each book contains historical and photographic coverage of the various airplanes, including bomber-group and fighter-group markings, nose art and insignia.

Price: \$14.95 each, plus \$2 shipping per order.

For more information, contact Sunshine House, Inc., P.O. Box 2065, Terre Haute, IN 47802.



COMPOSITE STRUCTURES TECHNOLOGY Vacuum-Bagging Equipment

Composite Structures Technology (CST) offers a complete line of vacuum-bagging equipment and supplies. The DeLux Vacuum-Bagging System (pictured) includes a small, industrial-grade, electric vacuum pump, two weights for bagging vinyl, bag sealant, mold release, plus all the accessories needed to complete a project. Weighing less than 6 pounds, the "conversationally quiet" pump has a maximum vacuum capacity of 25 inches of Hg. and can be run continuously without damage. The manufacturer guarantees these pumps unconditionally for one year. All items are available separately or as a complete package. CST recommends the optional vacuum gauge and relief valve when vacuum-bagging soft foams.

For more information, contact Composite Structures Technology, Dept. CN, P.O. Box 4615, Lancaster, CA 93539.

Classified

WANTED: Model airplane engines and model race cars made before 1950. Jim Clem, 1201 E. 10, P.O. Box 524, Sand Springs, OK 74063; (918) 245-3649.

SCALE DOCUMENTATION: Plan Enlarging. Photo packs, 3-view drawings for 1,600 aircraft. Super-scale R/C plans for Giant, Sport. 80-page catalog \$4. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; (919) 292-5239.

PLANS ENLARGED, Large Scale Specialists. PC Model Software. Free information. Concept, P.O. Box 669E, Poway, CA 92064; (619) 486-2464.

WANTED: Berkeley and Cleveland kits or related items: parts, plans, boxes, brochures, books, ads, radio equipment, accessories, etc. Gordon Blume, 4649-191st Ave. S.E., Issaquah, WA 98027.

GIANT SCALE PLANS by Hostetler. We fly what we draw. Send SASE to Wendell Hostetler's Plans, 1041 B Heatherwood, Orrville, OH 44667.

STRIPPED GLOW PLUG THREADS REPAIRED with stainless steel Heli-coils. 2-stroke heads \$7.50. 4-stroke \$10, postpaid. Send head only. Lee Custom Engines, 10112 Woodward Ave., Sunland, CA 91040.

MAKE A BEERCAN BIPLANE, 9 inches with 14-inch wingspan, \$9.95. Kit Three, Box 72104, Marietta, GA 30007.

ENGINES: IGNITION, GLOW, Collectors, runners, used, new. Sell, trade, buy. SASE for list. Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537.

OLD TIMERS, take a ride back in time to airplane modeling roots with this vintage book—*Gas Models*. A true collector's book from the early editors of *Model Airplane News*. It contains the best of modeling from the '30s and '40s, including great technical information and classic construction articles from the Golden Age period. \$7.95, add \$1.75 S&H; Foreign Surface Mail, add \$2.75; Foreign Airmail, \$5.50; Payment must be made in U.S. funds drawn on a U.S. bank or by an International Money Order. Air Age Mail-Order Service, 251 Danbury Rd., Wilton, CT 06897.

NOW, OAK FLIGHT BOXES! Last a lifetime. New designs for easy handling. Extra convenience. Kits or finished. Free radio flyer decal, catalog. Write: S & D Model Products, P.O. Box 4026R, Des Plaines, IL 60016.

ANTIQUE IGNITION AND GLOW PARTS CATALOG: 100 pgs., timers, needle valves, original cylinder heads, point sets, drive washers, stacks, spark plugs, plans. Engines: Atwoods, Baby Cyclones, McCoy's, Homets, others. \$8 postpaid U.S., Foreign \$20. Chris Rossbach, R.D. 1 Queensboro Manor, Box 390, Gloversville, NY 12078.

WANTED: RTF U/C planes and U/C race cars, mite cars; complete or pieces, with or without engines. Buy or trade. John Fietze, Box 1521, Amagansett, NY 11930.

WANTED: Model engines and race cars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105, (806) 622-1657.

CUSTOM EMBROIDERED PATCHES. Your design made any size, shape, colors. Five patch minimum. Free random sample and brochure. Hein Specialties, 7960 S.W. Manitou Trail, Glen Arbor, MI 49636.

FOR SALE: 1910-1960 model magazines, pulps, juvenile aviation books, historical aviation albums. \$1 list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3

R/C WORLD—ORLANDO, FL, CONDO RENTALS—2-3 bedroom-furnished. Available weekly or monthly. Low rates. 100 acre flying field with enclosed hangar. Swimming pool, tennis courts on site. Minutes from Disney World and Epcot Center. For information call Kyra, (800) 243-6685 or write to Air Age Inc., Condo Dept., 251 Danbury Rd., Wilton, CT 06897.

SCALE MODEL RESEARCH Aircraft Documentation. World's largest. Over 2,500 different Foto-Paaks and 5,000+ drawings. Catalog \$3. 2334 Ticonderoga, Costa Mesa, CA 92626 (714) 979-8058.

TEST FLIGHT VIDEO OF WARBIRDS all aluminum P-51D Mustang \$25. Complete kit \$5000 (less engine & radio). Warbirds Aviation, 122 Naubuc Ave., Glastonbury, CT 06033 (203) 657-3595.

HELICOPTER SCHOOL, 5 days and nights, all equipment supplied. Plus room and board on a 67-acre airport with lodge, used exclusively for R/C Training. Opening January, 1990 in North Central Florida. Owned and op-

erated by Ernie Huber, 5-time National Helicopter Champion and Helicopter Designer. Plan your winter or spring vacation NOW! Send \$2 for complete information package to: R/C Flight Training Center, P.O. Box 727, Crest City, FL 32112-727.

WANTED: Old unbuild plastic model kits. Planes, military, figures, cars, promos. Aircraft or missile desk models. Send list, price. Models, Box 863, Wyandotte, MI 48192.

WANTED: Your plan or kit for *Flying Model Warplanes: An International Guide*. Companies and individuals encouraged to register. Send Catalog to John Fredriksen, 69 Flamingo, Warwick, RI 02886.

PRIVATE COLLECTION: Hundreds of aviation magazines for sale: *Popular Aviation*; *Flying*; *Model Airplane News*; *Air Trails*; *RAF Flying Review*; *Wings*, and many others (1932-1960). All in excellent condition. For list, send \$2 to William C. Fort, Jr., 4161 Robin Hood Rd., Jacksonville, FL 32210.

TURBOJET ENGINES for R/C Model Aircraft, Jet101, JetFan, Pegasus VTOL, F101 with afterburner. Most sophisticated Model Turbojet Engines in the world. Replaces Duct Fan Units. Complete catalog \$5. JMW, Dept. 2, Box 60099, Pasadena, CA 91106.

WANTED TO BUY: Flying saucer and UFO plans and/or kits. Gas-powered or electric or rubber-band powered. Will buy complete assembled flying models. Klark Kent, P.O. Box 392, Dayton, OH 45409 (513) 298-7116.

VIDEO ASSISTED STILL AERIALS, too—"Birdseye viewer." See other ad: KLINDWORTH/KAWAI SUPERCIRCUITS, 1403-A Bayview, Hermosa Beach, CA 90254.

STUFF YOUR MAILBOX—R/C Catalogs, info., \$2. J. Braddy, 3037 Audrey Dr., Gastonia, NC 28054.

CLEVIS REMOVER, shipped, engraved, \$8.50. Reynolds, 1707 Carter, Vidalia, LA 71373.

AMAZING AMERICAN EAGLE GLIDER. Majestic full 21" span free-flight glider. High-performance/authentic detail. "Awesome!" \$5 plus \$1 postage. GARUDA GLIDERS, Box 461N, Kula, HI 96790. (Offer expires 4/30/90.) Distributors wanted.

LANCASTER BOMBER. Beautiful B&W 16x20 photo for \$14.95. Inquiries welcome/free brochure. CPC Productions, P.O. Box 9342, Seattle, WA 98109.

WANTED: Hasegawa Plastic Model, Curtis Seagull SOC-1 or any documentation. 1-800-333-0332 or 505-988-8001. Shidoni, T.C. Hicks, Box 250, Bishops Lodge Rd., Tesuque, NM 87574.

RC MODELER, 1965-76; Aeronautical Journal, 1970-80; other misc. aero mags. SASE for list. W.H. Bell, P.O. Box 572, Lynden, WA 98264.

WANTED: Competition quality photos or plan documentation for famed Reno air racer "Red Baron." Contact Richard H. Melau, P.O. Box 819003, Dallas, TX 75381 (214) 323-7717.

WANTED: Knight Twister scale plans or original drawings any condition. This is for half-scale model. Al Wise, 2155 Martin Rd., Mogadore, OH 44260.

WANTED: Gal partner to build R/C kits, San Diego, CA area. Call (619) 465-7327.

BIG PROFITS selling the "Equalizer," 50,000 volts of legal Stun Gun power. Brochures, confidential price list and sample gun, \$39.95 (\$54.95 value). Impala, 522 9th N.E., Canton, OH 44704.

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HELI WORLD CHAMPS

(Continued from page 126)

Mystere lost a lot of altitude in mid-Roll, and he exited the maneuver below the tree line. Bingel's 180 Auto ended in the tall grass more than 100 yards from the judges.

Round 4: Wallington's Kalt was off course pulling out of the Rolling Stall Turn, and it headed toward the judges (pilot apologized!).

Another Rolling Stall Turn caused concern when Barbuto exited the maneuver side-down and didn't level out until he was less than 8 feet from the ground. Campbell also had a distant Autorotation landing, though not quite as far out as Bingel's.

In-flight mechanical failures/emergency autorotations: Round 1: Youngblood sensed something was wrong late in the hovering segment, and he shut down his Split Ranger after the Roll rather than risk a tail-rotor failure. The main gear of Len Mount's Jet Ranger came loose while he attempted the 540 Stall Turn, but he saved the machine with an emergency auto on the right side of the course. Gerkens lost his tail rotor when exiting the 540 Stall Turn; he recovered from a side-down attitude to land, engine off, undamaged.

Round 4: Gerkens had to dead-stick it again when his Star Ranger's engine quit after the Rolling Stall Turn; he had the presence of mind to execute a small circle before his final approach so he earned credit for the 180-degree heading change required for the Autorotation. In a position to take 3rd with his good score, Graber heard a ratcheting noise from his Sitar Jet Ranger during the hovering maneuver. The noise worsened, and the entire crowd was listening carefully after the Nose-In Circle. Just after the 540 Stall Turn, several teeth stripped and the main gear let go. Graber killed the over-revving engine and autorotated down—a disappointing finish to his World Championship effort.

Despite these malfunctions and shortened flights, the four pilots involved finished 3rd, 7th, 8th and 17th.

Demonstration flights: Dan Melnik with a Kalt Excalibur—full Roll in a vertical dive at the practice field.

Curtis Youngblood: Low-to-High Vertical-S during his practice flight. Tail-First Rolls and Tail-First Outside Loops with his freestyle ship.

Shigetada Taya ('85 to '86 R/C Helicopter World Champion and designer of the Kyosho Concept 30)—Exterior Tail-In Circles; Exterior Tail-First Circles; Tail-slide; High-to-Low Vertical-S (half outside

loop; hold inverted; half inside loop); Diamond Loop—all with a Concept 30 in a Hughes 500 fuselage using a stock muffler.

Cliff Hiatt (U.S. Team Manager), flying a Concept 30 for fun after the contest had ended Thursday: Immelmann to four consecutive Hovering Rolls; Rolling Circle; Low-to-High Vertical-S; Cuban-8; and a Triple Forward Somersault (three hovering outside loops). Not surprisingly, this brought applause from the crowd.

Fentress Fuselage Types

Scale:

Bell 222 with retracts: 1
Jet Ranger Variants: 20³/₄
 Heim Star Ranger: 7
 Schluter Long Ranger: 4
 GMP Jet Ranger: 2³/₄
 Kalt Jetstream: 2
 Schluter Magic Ranger: 2
 X-Cell Long Ranger: 2
 Sitar Jet Ranger: 1

Purpose-Built/Non-Scale: 14¹/₄

X-Cell Quicksilver: 5
 Helm Lockheed 286h: 4
 Hirobo Nova: 1¹/₄
 Hirobo SideScoops: 1
 Kalt VentralFins: 1
 Verplanke-Heim Mystere: 1
 Verhagen-Heim U-Boat: 1

Pod and Boom: 5

Kalt: 2
 X-Cell 60: 2
 Schluter Champion: 1

Total: 41

(Fractional counts owing to substitution of backup equipment in one round.)

I hope this gives you some idea of the action we saw at the FAI/F3C Helicopter World Championship; the exhilaration of seeing the best perform lives on long after the event is over. See you there? ■

HELI CHALLENGE

(Continued from page 105)

"In time of peace, prepare for war."

A final word about crashes: Always replace any part that's questionable. Whenever I've tried to save a few dollars on repairs, it has come back to bite me. Never try to reuse or repair any part that carries a load. This is especially true for plastic parts, since they can wear out and fail without much visible warning. It's OK to straighten out mainframes and landing gears, etc., as long as they aren't bent too badly; otherwise, replace that part!

I have a new Kalt Excalibur on my workbench, and I hope to have a mini

flight report for you next month. So far, the kit is going together nicely (I expect nothing less from Kalt), and I'm quite excited about evaluating its performance.

Until next month, keep your bird in the air; if that doesn't happen, don't let a crash take all the fun out of our sport. ■

F-86 SABRE

(Continued from page 110)

thing come together. This simply means that you must exercise some degree of craftsmanship and patience. If you're the kind of modeler who usually builds with a knife and fork, this kit is *not* for you. Bob Violett has spent over 2,600 hours to ensure that you will get one of the finest kits that money can buy. All he expects in return is that we spend around 60 hours putting it together! The engineers have already been through the construction sequence and have planned the manual accordingly. There's no way to save a few steps. Don't try to re-engineer this kit! Just do what the manual says, and you'll have one of the slickest-looking jets around. You'll actually *build* this kit, not just assemble it. This should be an enjoyable building experience; I know it certainly was for me!

CONSTRUCTION: Many ducted-fan kits have a bad reputation for "self-destructing" at the most inopportune times. This won't be one of them! The fan unit is double-shock-mounted to insulate the airframe from vibration and noise, and the gear will absorb any abuse you throw its way. Since there are various reference points molded into the fiberglass fuselage, it's very difficult for you to go astray when you mount the wing or the stab. Once again, the instructions offer an accurate way to properly set up the dihedral and other critical dimensions. I don't see how anyone could possibly build this thing crooked!

This model incorporates scale flaps in its design. They aren't absolutely necessary, but are strongly recommended for enjoyable flying. The Sabre handles so well with flaps, however, that it would be a crying shame to shy away from them. This is one airplane that handles flawlessly when the flaps are dialed-in. Please don't be afraid to use them. You'll find that you can easily fly at half throttle with the flaps extended, and forget that you ever dialed them in! As you come off the throttle, you simply add a little elevator for a perfect landing.

It took some time to set up the landing

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gear struts so that the Sabre would track absolutely straight when pushed gently down the street in front of my house. Bob then suggested that we drive up to his place for a photo session and the test flight.

PERFORMANCE: After spending a couple of hours correcting a few mistakes I had made, we took off for the flying field with only a couple of hours of daylight left. The ship tracked straight as an arrow. I remember Bob telling me to rotate, but the Sabre just kept on rolling. After an extra 50 feet of runway was consumed, it parted company with the runway and

(Continued on page 135)

MODEL AIRPLANE NEWS HOBBY SHOP DIRECTORY

Retailers: Make your business grow with new traffic! Now you can advertise your hobby shop in the **Model Airplane News Hobby Shop Directory**. The listing will be published monthly and will be listed according to city and state. You will have 3 to 4 lines, approximately 20 words, in which to deliver your sales message, plus space for your store's name, address, and telephone number.

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of it. You must follow the instructions to keep your feet out of the wringer. Go for the optional sequencing landing-gear door set-up: It's well worth it. (If you'd rather just cut out some wheel wells, that's OK, too, but you'll lose about 10mph in top speed.) The flaps are fantastic, so be sure to use them. The kit has been engineered like nothing you've ever seen. Almost any adhesive will work well on the epoxy glass fuselage and hatch. (Bob suggests Zap CAs and epoxies.)

My Sabre weighed 11 pounds exactly, but it was slightly nose-heavy. After moving the 1200mAh battery pack rearward approximately 12 inches, the airplane rotated nicely and more quickly. The '86 requires a minimum of six channels, but you must use additional channels if you install drop tanks, in-flight mixture, etc. You *must* use Bob's own Violett in the Sabre, because other fan units won't fit and, therefore, won't work. You can get another engine to fit the fan unit, however, but how anybody could find a sweeter, smoother, more powerful motor than the KBV 82 is beyond me!

My only negative observation? Any time a 2-56 threaded rod is used in a nylon fitting (e.g., a ball socket), don't use 1/16-inch wire with cut threads. For the nose-gear door, I had to substitute a cut-down 2-56 bolt so that the ball link wouldn't pull off the threaded end of the rod! (The bolt has rolled threads, which are far superior to the cut variety.) This isn't a fault of the kit, but rather with the manufacturer of this particular threaded rod. The threads simply aren't as aggressive as the same size threads on a larger rod or a bolt.

Quality, performance and service are the three words you'll come to associate with this kit (or, for that matter, any other BVM kit). One more thing: While flying this scale model, there will come a time when you absolutely will *not* have to check your six. You know why? There just ain't no way that anybody could be back there!

**Here's the address of the company featured in this article:*

Bob Violett Models, 1373 Citrus Rd., Winter Springs, FL 32708. ■

F-86 SABRE

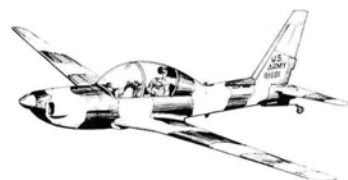
(Continued from page 131)

quickly got up to about 400 feet. I dialed-in exactly one click of left aileron and three clicks of up-elevator. As I cavorted around the sky, I was thoroughly happy.

This airplane handles like none you've ever flown, I promise you that. Its envelope goes from an extremely stable 30mph to a blistering, but stable, 160mph. The flaps work effectively and make landings a real breeze. Without flaps, the Sabre will glide for an awfully long time at idle power. When you pour the coals to it, it

climbs for altitude like a rocket. It looks extremely attractive during any rolling maneuver, especially a slow roll. But even though the ship is a real pussycat, it still wouldn't allow me to fly it with one hand. That's why the Sabre in the photos is Bob's camouflaged version; it was a lot easier to point the camera at *his* ship while *he* was flying, than it was for me to aim at *my* ship while *I* was flying!

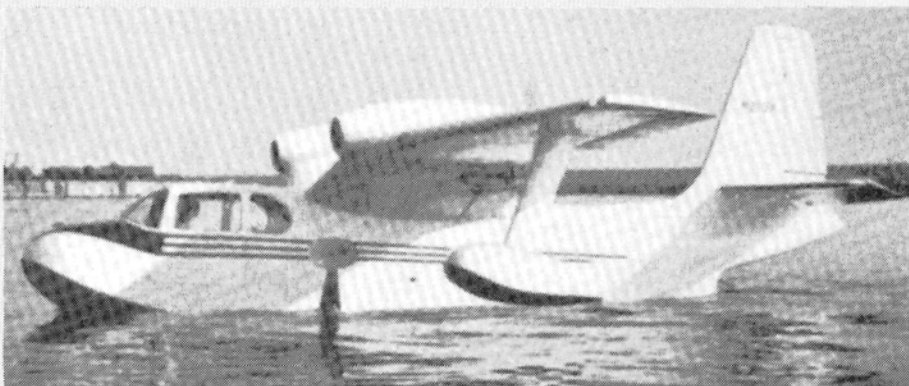
OK, here's the summary: The BVM F-86 Sabre is an above-average kit of extraordinary quality. It's not inexpensive, but quality usually isn't. It takes some time to build, but it's worth every minute



NAME THE PLANE CONTEST

CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to **Model Airplane News**, Name the Plane Contest (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.



Congratulations to Kenneth Sontag of St. Louis, MO, for correctly identifying the Bell XP-77 fighter shown in our November issue. Ken's name was chosen from the 61 correct answers we received. Obviously, there are a lot of Bell fans out there!

The XP-77 was an experimental all-wood, lightweight, single-seat fighter that was designed and built in 1943—a time when there was a shortage of aluminum-alloy metals. The plane had a 575hp, Ranger V-770-7, 12-cylinder, inverted-vee, air-cooled, supercharged engine and a maximum speed of 330mph. Almost 23 feet long, the XP-77's wing had a span of 27.6 feet, which provided 100 square feet of area.



The plane was designed to be a light interceptor and was developed to outperform the Mitsubishi Type "O," but it wasn't rugged enough to carry the needed heavier guns and leakproof tanks, and it offered little pilot protection. Only two of these planes were built before the project was scrapped because of poor performance and because the need for a fighter built to those specifications

no longer existed.

The plane did, however, make it into the pages of *MAN*. The August '45 issue featured a three-view illustration by Dick Everett along with construction plans. ■

The name of the winner will be drawn four weeks following publication from correct answers received on a postcard delivered by U.S. Mail and will receive a free one-year subscription to **Model Airplane News**. If already a subscriber, the winner will receive a free one-year subscription extension.

GOLDEN AGE OF R/C

(Continued from page 115)

Kraft Systems

Kraft is one of the most popular U.S. brands, but I haven't been able to uncover specific details, so I'll just tell you as much as I remember. (I'm sure someone reading this will respond to my plea for more information!)

Phil Kraft began very early, in a small way, with single-channel stuff, and the company grew constantly during the reed era. When digital arrived, Kraft Systems had extensive production facilities that allowed Phil to turn his R&D department loose in developing a digital system. Their first offering was on a "custom-built" basis—quite expensive! Kraft probably learned much with this. Rapid progress led to the production of digital systems by other manufacturers, so Kraft soon had a competitive production system on the market, too. Kraft's chosen color was gold, and his system became the most widely used.

Like other pioneer manufacturers, Phil

Kraft was an accomplished modeler, and he also had a consuming interest in pattern competition. Using his reed systems, Phil made his mark early at the national level, and he naturally moved on to digital while winning major events, including the Nats. In the mid-'60s, he found himself on the American FAI World Champ team, and he emerged as the World Champ.

An astute businessman, Phil took full advantage of his personal accomplishments to promote his products. By this time, Kraft Systems had almost perfected the digital concept; its offerings were most reliable. Extensive advertising boosted the popularity of the Kraft "Gold Medal" series, which received immediate acceptance. It wasn't long before the flying fields were dominated by these "gold boxes"!

To meet demand, Kraft Systems expanded into a major operation. Plant size was dramatically increased, with "Mottown"-style production lines in evidence everywhere. Best of all, with Phil's guidance, the product's high quality was main-

tained, while cost cutting led to more attractive prices. A tour through the Kraft facility revealed an almost-unrivalled operation. Kraft Systems was first-class!

Each year, the latest developments were engineered into new models until a plateau like the one we see today was reached. By then, discriminating modelers were looking for something more than the usual run-of-the-mill systems—perhaps something with infinite performance and almost military-style specs. This demand led to Kraft Systems' *ultimate* offering: Considering *only* desirable performance, and throwing considerations of cost to the winds, Kraft offered the "Signature" series (naturally, autographed by Phil!).

These Signature systems were the finest available anywhere at that time. (You might relate them to the "ultra systems" some manufacturers offer today.) Costing more, and having more features than the average R/Cer really needed, the system found a home among dedicated contest fliers. This really shows the Signature quality; I even hear that some of you are

(Continued on page 138)

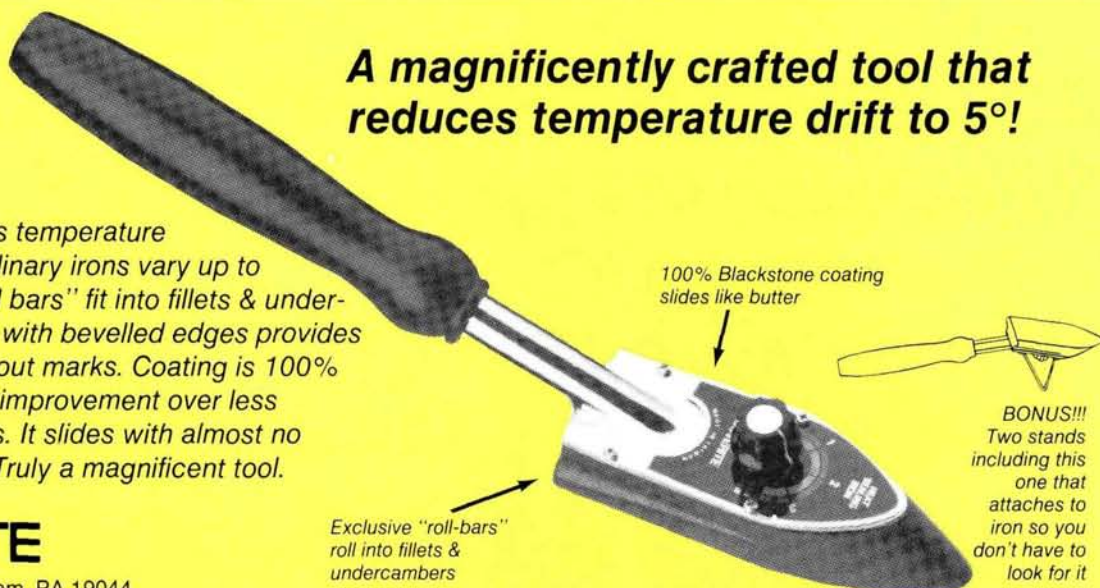
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GOLDEN AGE OF R/C

(Continued from page 136)

still flying them, *many* years later!

At this point, Kraft Systems had reached a pinnacle with this popular product; business was very good, and the future looked bright. During this period, the conglomerates became interested in "leisure time" activities and possible business opportunities. Apparently, one of them offered Phil a "difficult-to-refuse" deal and he accepted it, passing on control to new people, while he was retained as a consultant.

At that time, the Japanese were making inroads into the U.S. R/C market, and American corporations making radios and

televisions soon found it attractive to produce their products in Japan. Apparently, the trend affected the new Kraft regime, and Kraft offerings took on that Far East look. On the face of it, this wasn't a bad idea; but Kraft's customers were accustomed to Phil and the American look, and perhaps it was this, and minor problems with the foreign-built products, that brought the operation to a halt. Phil left the corporation for other endeavors (our loss, for sure), but we're happy that we still see his smiling face at the Vegas TOC!

Proportional Control Systems

The head honcho at Proportional Control Systems (PCS) was Cliff Weirick—you

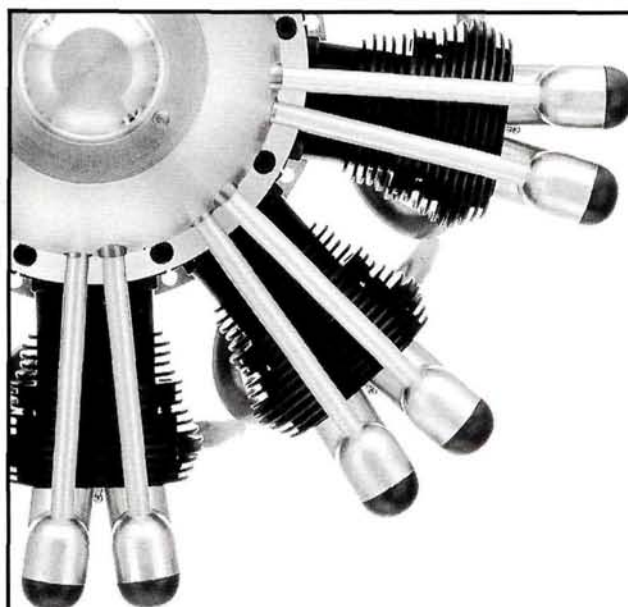
know him as a main cog at Airtronics now. Like Phil Kraft, who was a modeler first and a businessman second, Cliff had already made his mark as a national pattern champion, and even as the AMA president, by the time PCS was started. He was, and still is, a well-respected and accomplished modeler and electronics technician.

Earlier, Cliff had been employed by Bonner Specialties, which was producing the Digimite propo systems, and he says that Howard had announced his imminent retirement and the closure of the operation. Naturally, key employees were looking for new opportunities, and this set the stage for Cliff's involvement with PCS.

Now back to Phil Kraft. (You'll soon see why!) By that time, Phil was into mass-production with his Gold Medal Series, which required special tooling and all that goes with producing large quantities. The cost of this was considerable, and Cliff was also updating the series in significant ways each year. He was *changing* systems that were *already* very acceptable; the new ones might be better for some reason, but the old ones were still most usable.

Phil saw an opportunity in this: All the costly tooling, etc., had been set up for a system that was now outmoded, and the year's production had paid for it. Could there be some way to continue the old-style production without conflicting with the needs of new offerings? If so, savings could be made on tooling, and there could be a major reduction in prices while the factory's production was expanded. If another brand and outlet were established, the concept could be investigated.

(Continued on page 143)



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CLUB OF THE MONTH

THE RADIO CONTROL AIRCRAFTERS OF WESTERN NEW YORK

THE FIRST THING that strikes you when you look at "The Flight Log" (the official newsletter of the Radio Control Aircrafters of Western New York) is its humorous approach to our sport. The September/October 1989 issue uses cover illustrations of an assortment of characters to help introduce stories and announcements. Inside, there's an amusing comic strip about a character called "Joe Mod-eler" whose ready-to-fly Turkey Buzzard turned out to be the real thing! A cartoon labeled "Expect the Unexpected" illustrates a man hand-propping his full-size plane. In the next frame, to his surprise, compression has won, and he's still upright, but his airplane is inverted!

With the approach of colder months, members are reminded that, beginning in October, meetings will be held indoors. We hope everyone attended the first meeting and got the winter season off to a good start within warm confines.

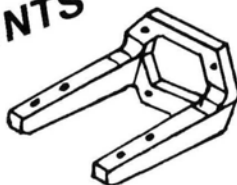
A column called "Float Flyin' Report" includes float-building tips, and other useful suggestions include tips on how to use K&B SuperPox paint. Even more interesting is the advice on using Black Baron Flat Clear to eliminate the unrealistic gloss you see on many of the plastic coverings. "I happened to look up on my shelf in my workshop and saw a can of paint beckoning me to grab it and try it," the columnist wrote. It apparently did all the right things!

The "Special Report" column gives the names of those who won the last club pylon race; member Bob Hauth took the top prize in this September 26 event. Bruce Knox won the "Carl and Beth Goldberg Vital People Award," which is a UPRC award given each year to an individual "whose behind-the-scenes efforts enhance the enjoyment of our hobby." Newsletter Editor Chet Bojak tells readers that Bruce certainly deserves the award: "He is one of the few people I know who consistently offer to help new pilots at the field, regardless of who they are—club member or not." Way to go, Bruce!

In the "Tall Tales" column, a whimsical story, reprinted from another club's newsletter, relays the plight of a flier on his first flight: "Alas, on his attempt to fly, he crashed. His plane of beauty and graceful lines became vicious and spiteful in the air." In the story, a young lad learns to build "a plane of great functional beauty"—you know the kind! It may not look like a prince, but it flies a lot better than a frog!

We're delighted to name the Radio Control Aircrafters of Western New York as Club of the Month. They'll get two subscriptions to *MAN* for the members of their choice. Keep up the good work with "The Flight Log," and maintain that "lighter than air" sense of humor!

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GOLDEN AGE OF R/C

(Continued from page 138)

To say that results were excellent would be an understatement for sure! What happened? Kraft organized Proportional Control Systems with Cliff Weirick as operator. With Cliff's Bonner in trouble, the project looked good to him, and Cliff tells us it was the best decision he ever made!

They took the previous year's basic Gold Medal system and changed its color to brown. Then they labeled it "PCS," and offered it at a much lower price. It was obvious to many modelers what had been done, and the savings looked very attractive. Soon, many "brown boxes" appeared at the fields! Many OTers will remember the PCS ads more than anything else. How many PCS buyers were enticed by the pretty, scantily clad girl who dominated the ads?

Phil Kraft got into full-scale flying and eventually built his own aerobatic design, and Cliff built and flew a three-quarter-size F4U, which he really enjoyed. More recently, Cliff couldn't pass the FAA medical, and this ended his efforts with full scale, but being a modeler at heart, he turned to giant scale and says that it's almost as much fun.

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KRC FLY-IN

(Continued from page 123)

to most modelers, but it has gained in popularity during the last five to seven years.

The New Stuff

As I think back to the first KRC Electric Fly, I think about the changes that have taken place. Ten years ago, most gliders used inexpensive .05 or .075 can-type motors with direct drive. The hot ticket now is an .05- to .15-size cobalt motor with a gear-reduction drive turning a large folding prop. Most gliders are about 2 meters, but a number of larger

ships can be seen, too, and many now use the faster airfoils, e.g., the Eppler series.

Also more apparent are the .25 to .60 motors in the larger sport and scale electric models. Some of these motors use up to 28 cells and are quite impressive. There are, and will continue to be, many .05 aerobatic models, but I think the average sport model will soon be a .40-size plane running on about 18 cells.

There are also many more kits and good ARFs available today. The variety at this year's KRC Electric Fly shows that virtually any model can be electric powered—everything from highly aerobatic sport models to beautiful scale models. The key is still: Keep it light; if you build a light model, you won't be disappointed with electric power, but if you build heavy, you'll probably end up with a model that doesn't perform very well. Of course, this applies to fuel power as well; lighter is almost always better.

Another recent change has been in battery capacity and type. Ten years ago, most systems used the 550mAh cell and were lucky to get more than a three-minute motor run; today, most pilots use the 1200mAh cell, and many are going to the 1800mAh size. For lower current applications (10- to 15-amp drain), many are

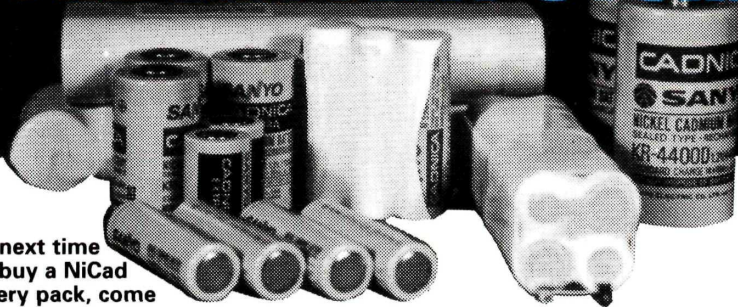
now using the new 1250mAh and 1800mAh magnum cells, which weigh essentially the same as the standard 900mAh and 1200mAh cells, respectively. The only disadvantage is a higher internal resistance, which causes the cells to generate more heat in high-current applications (15 to 25 amps). They can become very hot if they aren't used properly. Of course, heat isn't conducive to a long battery life, so it pays to keep them cool.

Last, I see a number of good speed controls, most of which utilize power Mosfets. There's no reason why any electric-powered model can't have an effective throttle range from idle to full power, with very little power actually lost in the speed control. Radio manufacturers are starting to offer systems designed especially for electric power, and these usually incorporate lightweight servos and a built-in speed control.

What does it look like for the next 10 years? Well, I'm sure that electric flight will continue to grow in popularity and that more people will see it as a viable alternative to fuel-powered flight. We're all waiting for *better batteries*. Without Ni-Cd batteries, electric flight wouldn't be

(Continued on page 146)

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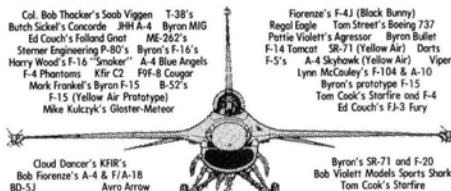
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(Continued on page 146)

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KRC FLY-IN

(Continued from page 143)

possible as we now know it, but they're still the limiting factors. All our power comes from batteries, and until we get one with more energy and less weight, we'll just have to use what we now have in the most efficient manner.

On Sunday afternoon, when the meet was over, we returned the field to the Quakertown club, and some of its fuel-powered members were ready to fly. As they fired-up their engines and peaked them out, I heard one of them say, "It sure is easy to get used to clean, quiet, *electric* flight!"



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